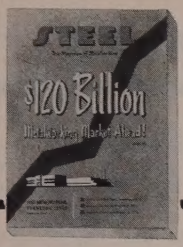

STEEL
The Magazine of Metalworking

VOL. 128 NO. 1 JANUARY 1, 1951

1951 METALWORKING YEARBOOK ISSUE

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Next Week: **. . . An appraisal of the prospects for titanium . . . How Buick cuts costs in cleaning forgings . . . Riverside adds nonferrous strip capacity . . . Cutting costs with molybdenum coated steels**

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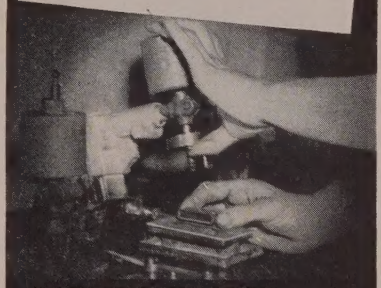

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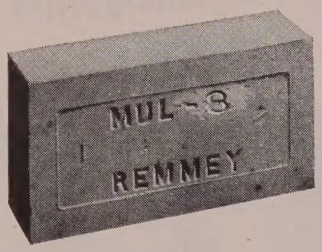

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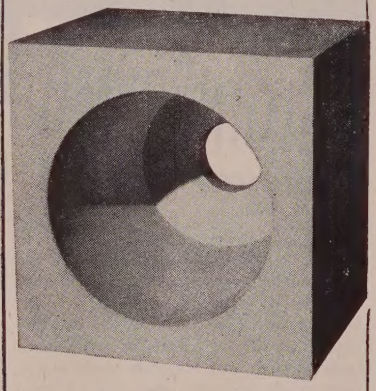

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Behind the Scenes . . .

Sound the Trumpets

If we knew how to blow a trumpet, we'd sound a fanfare. For this is it —the 1951 Metalworking Yearbook issue. It's your guide to what has happened and what will happen in metalworking in economic and engineering news.

If you want to know what will happen in the next decade, get your data from the prospect story that begins on page 85. If you want an idea of where your company's sales should be by 1960, that story gives you a quick way to figure your volume. The trend in technical and engineering aspects of metalworking are outlined in the Forum on Technical Progress beginning on page 157.

If you want to know what's already happened, turn to page 117. The Facts & Figures section give you a concise but complete source for all important metalworking figures. A chronology of 1950 events—cartoons by Pat Dwyer Jr.—can help you recall what's happened in the past 12 months. The Washington and Detroit sections analyze the varying trends that affect metalworking. The calendar gives you most of the important dates for conventions and shows in 1951 that have been announced thus far.

The art department came through in its usual resounding style, to help the 26 editors turn out metalworking's yearbook issue.

Covered

Until a few weeks ago we always thought a cover was simply . . . well, something to wrap around something else. We know now it's far more than that.

The editors and the artists who cooperated to produce STEEL's first editorial front cover, for this yearbook issue, have taught us some of the nuances of cover-making.

"You get an idea, execute it and then tear it up," says Ed Birkner, one of the editors who helped and will continue to aid editorial-art coordination on the cover job.

"You do that three or four times until you get what you want—something that looks like a gift wrapping and acts like a message on a billboard," say Bill Kellogg and Don Cadot, artists who had a lot to do with this cover and who will be involved in many more to come. Artists Mac MacBain, George Farnsworth and Robin Allen will also be getting the cover assignments in subsequent issues.

We figure that the cumulative distance walked by editors and artists between their bailiwicks on the ninth and eighth floors just to get together on this one cover was 27.3 miles. They burned up the interoffice telephone lines with 108 calls on the thing. They made nine "dry-runs" covers before they started on the live job. That takes as its motif STEEL's estimates for metalworking's 1960 sales. The cover each week will pick up some article featured in the current issue.

In executing the dry-runs, the artists decided that gray would be our distinctive cover color from now on, that we would put the date line just so that the word "STEEL" would appear in yellow in such and such a type.

The procedure is set up; the decisions are made. Editors and artists are ready to bring you a better and better magazine during 1951.

New Order

Are you oriented yet? As you have probably already discovered, we're starting off the year with a new page arrangement, to give you easier reading. We are on page 6 now, a spot we'll occupy from here on in.

Contents are moved up to page 5, so you can find it quickly. The news summary becomes "The Metalworking Outlook" and is expanded to two pages to give you more of the news behind the news. The masthead is shifted to page 10.

Off to Chicago

Bill Poland is a new advertising sales representative in the Chicago territory for STEEL. He joined the magazine in 1947 as a circulation salesman. During the past two years he has been an advertising salesman for STEEL in Ohio and Michigan.

Bill is married and has two youngsters.

Shrdlu

(Metalworking Outlook—page 77)

The Metalworking Outlook

End-Use Steel Controls by Jan. 31

Expect end-use limitations on steel before the end of January. Controls will affect all consumer durable goods; the first order will be on sheets, most commonly used steel product in civilian items. Curtailment of sheet consumption will divert more steel to plates. The plate output may hit 600,000 tons this month.

$40 Billion in Defense Hard Goods by 1952

The U. S. will buy $17.5 billion worth of tanks, planes, guns, munitions, ships and other hard goods in 1951; $40 billion in 1952 (p. 92). Metalworking must supply that on top of civilian demand that strains its capacity. So, resign yourself to a flood of controls on nearly everything in the coming months. The government won't be anxious to clap on wage ceilings, but they'll come.

No Controlled Materials Plan—Yet

Federal allocators are shying away from a controlled materials plan now. They don't think a revival of the program used in World War II is yet necessary. Even if they started today to get it going, July 1 would be the earliest they could have CMP in full working order. But a certainty is this: CMP will come eventually. We haven't the raw materials to use them willy-nilly in a long war against Communism. War or no war, prospects for metalworking in the next decade are excellent—at least a $120 billion sales market by 1960 in terms of present dollars, compared with a $81.5 billion volume in 1950 (pp. 85-100).

Parallel Route for Canada

Canada's economy will head down a road similar to ours in 1951. Steel controls go into effect today in the Dominion, largely because U. S. shipments across the border have been dropping. In past years American companies supplied Canada with about one-third of her steel, or roughly 1 million tons a year, but 1950 shipments were far under that figure. The U. S. is allocating American-produced metal to Canadian warehousemen and manufacturers of ore boats and freight cars.

Men, Materials: Key to 1951

Enough steel for DO programs now—that's the current Washington thinking. But materials supplies and manpower will be the key to your economic performance in 1951 (pp. 95-100). You'll have to scramble for steel and nonferrous metals if you have no DO rating. Steel production will climb from 96.5 million ingot tons in 1950 to more than 100 million tons; that still won't be enough. About one-third of the output of all kinds of machinery will be going to defense in the next 12 months. Home appliance production will drop 20 to 30 per cent in 1951. The auto outlook is bright for the next decade, but

rket Outlook—p. 337

less cheerful for the immediate months ahead because of controls. Makers of transportation equipment other than autos expect a peak year.

Autos: Guinea Pig for Controls

Government planners will concentrate much of their control experimenting on the automotive industry in the next few months. We'll have to pay compound interest on their mistakes for they are tinkering with a colossus. About 9 million people are employed in industries related to highway transportation (p. 109). With its many facets, the total automotive industry has become a $25 billion-a-year enterprise, accounting for more than 20 per cent of all retail trade and encompassing over 435,000 establishments.

There'll Be Some Changes Made

Start now to analyze your plant and equipment to see if it will stand the production strain of the 1950s (p. 94). Metalworking must clean up its own back yard and win government reforms, too, to bear the double burden of producing for the military and civilians in the coming decade. You can help win wiser income taxes and more equitable treatment of depreciation allowances for tax purposes. Above all, re-examine your methods of re-equipment analysis.

Needed: New Source for Capital

New capital in the years ahead can come from middle-class families. Today only 8 per cent of American families own corporate stock, although 77 per cent have life insurance and 44 per cent have savings accounts.

Facts and Figures

To make reasonable projections about metalworking's performance in 1951 and other years ahead industrialists need good statistics on what has happened in the past. To find figures both accurate and all in one place is difficult in as complex and heterogeneous an industry as metalworking. STEEL has performed that service for you (pp. 117-148) in its annual Facts & Figures section.

Engineers Get Set for Defense

Steel production of 125 million tons annually by 1970 would take 140 million tons of ore. To meet such an ambitious schedule would require the completion of new large taconite processing plants, more railroads, freighters and ore handling equipment (p. 168). Cold extrusion is one of the hottest subjects in the press field. Army Ordnance is extruding artillery shells on a hydraulic press. More uses are imminent (p. 203). Coloring of galvanized coatings is under study, with the idea of creating new product appeal. For instance: Pastel galvanized fences around country estates, rose-colored garbage pails (p. 233).

January 1, 1951

Agenda for 1951

As a nation we start 1951 with determination to strengthen our defenses in the hope we may avert World War III. No sane person questions this emphasis on preparedness. There may be quibbling as to details, but there is universal agreement on the main objective of a stronger defense.

Fortunately there is also general acceptance of the fact that in order to provide for adequate defense we must cut down on accustomed peacetime requirements. Our economy is not capable of meeting the heavy demand for rearmament on top of the unprecedented demand for civilian needs.

This brings us to the problem described by the hackneyed expression "guns versus butter." Hitler used it to exhort his fanatical followers to make every possible sacrifice in order that military might could be expanded to the limit. For more than a decade the Japanese were forced to suffer untold hardships in order that the war lords could develop Nippon's fighting machine. Russia has always insisted that her millions live in near poverty in order that the military may receive an outrageously high percentage of the fruits of the nation's economy. In all of these instances, the hardships of day-to-day living were accompanied by a tragic loss of personal freedom.

In tackling our problem of rearmament we should profit from the lessons of history and pursue a course that is compatible with our unique economy. We are strong because our economic system distributes the benefits of production to a larger proportion of the people than in any other major nation.

To maintain this strength under conditions of a garrison state we must do these things: 1. Determine on the basis of the most expert advice available just what is needed for preparedness. Having determined this, let nothing interfere with its accomplishment. 2. Place the major emphasis of all governmental, industrial and social activity upon the goal of maximum efficiency and production to the end that while military requirements will be fulfilled 100 per cent, output for civilian needs will be reduced as little as possible. 3. Make every effort to preserve for individuals and corporations as much freedom as is possible.

Maximum production and efficiency constitute the order of the day for 1951.

* * *

$120 BILLION BY 1960: Hard-working editors of this publication have undertaken a terrifically difficult assignment. They have taken on the chore of projecting the prospects for the metalworking industries a full decade ahead. On the basis of conservatively documented data, they come up with the significant prediction that the market for the products of the metalworking industries in 1960 will total $120 billion.

To really appreciate what this means, note carefully that sales of these industries in 1940, on the basis of 1950 dollars, totaled $39.8 billion. It is estimated that they amounted to $81.5 billion in 1950. The jump from 1950 to 1960 is not too fantastic when you consider the gain from 1940 to 1950.

What factors support this optimistic prediction? Among them are an unexpected increase in the birthrate in recent years and a spectacular increase in the buying power of the public. In a relatively short time our economy has shifted from a status where the relatively few rich were the chief purchasers of luxury items to a situation where millions of persons in the intermediate and lower income brackets are

(OVER)

AS THE EDITOR VIEWS THE NEWS

purchasers of most of the gadgets which strike the public fancy.

Study this analysis of prospects for the next decade carefully. It contains a lot of information that will help you to operate more profitably in the exciting days, weeks, months and years ahead. —pp. 85-100

* * *

IMPROVING THE PAPER: Beginning in this issue, a number of changes are being introduced to improve the publication. The front cover, which heretofore has carried advertising, will be used by the editors to invite the attention of readers to one or more outstanding articles in the editorial section of the book. It is believed that under this new policy, front covers will reflect more faithfully than heretofore the scope and balance of editorial content.

The contents page, which formerly immediately preceded the main editorial section, has been moved forward to page 5, where it will be easier to find. Shrdlu's popular "Behind the Scenes" is assigned to page 6, the masthead listing business and editorial department personnel is on page 10, and "Letters to the Editors" are on page 12. The "News Summary," appearing three pages east of the page you are reading, has been changed to "The Metalworking Outlook" and expanded to two pages.

We think you will approve these changes.

—pp. 5, 6, 10, 12, 77

* * *

CEILING UNLIMITED: A year ago the consensus of experts in the auto industry was that output of motor vehicles in 1950 would be 5,845,000, a decline of 10 per cent from 1949. Today with production in December estimated it looks as if the official total for the United States and Canada for 1950 will be around 8,295,000 units. The experts underestimated assemblies by almost 2.5 million!

This prompts the question as to just what is the potential of American industry. What could the nation turn out in steel, automobiles, machinery, etc. if everything were clicking smoothly? (Remember that the fabulous auto output of more than 8 million was accomplished in spite of strikes, material shortages and other handicaps.)

If we could manage to get every element in the industrial machine to working smoothly, the ceiling of production would amaze us.

—p. 109

AMAZING STATISTICS: Throughout the years various organizations have developed hundreds of series of statistics pertaining to the metalworking industries. Most of them appear in a special 32-page section in this issue. You will be impressed by the variety, scope and penetration of these figures.

For instance, they will inform you how the 8482 pounds of steel in an average 6-room house is distributed; how many gears, kitchen cabinets, stoves, vacuum cleaners, automobiles or what not were sold and shipped monthly in recent years; the distribution of stainless, alloy and carbon steel by consuming groups; prices of principal ferrous and nonferrous metal products; and almost anything you want to know about employment, wages, hours, etc.

Probably the most spectacular single figure is that of total steel ingot output for the entire world in 1950. It is 203,200,000 net tons. This is the first time in history that steel production has exceeded 200 million tons or even closely approached it. pp. 117-148

* * *

NEW KNOW HOW ON TAP: In the mobilization of the metalworking industries for defense, which will gain g r o u n d steadily throughout 1951, one of the important factors in its success will be the proper utilization of the new ideas and developments created by the industry's engineers, research workers, process specialists, designers, metallurgists and other technicians. A careful examination of the text of this publication's "1951 Technical Forum on Progress in Metalworking" will convince the reader that a vast reservoir of pertinent "know how"—acquired and accumulated in recent years—lies at the disposal of those charged with producing goods for our rearmament program.

After reading the comments on technological progress written by the 173 experts who contributed to the forum, one will be forced to conclude that in many respects many of the techniques employed in World War II already are obsolete in varying degrees. A lot of new chapters in the art of producing efficiently will be written in the hectic months ahead.

—pp. 158-276

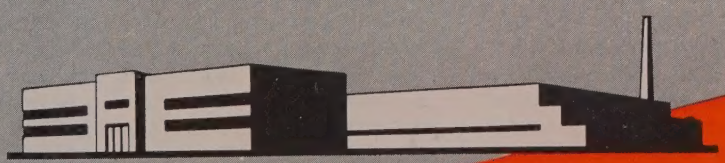
E. L. Shaner

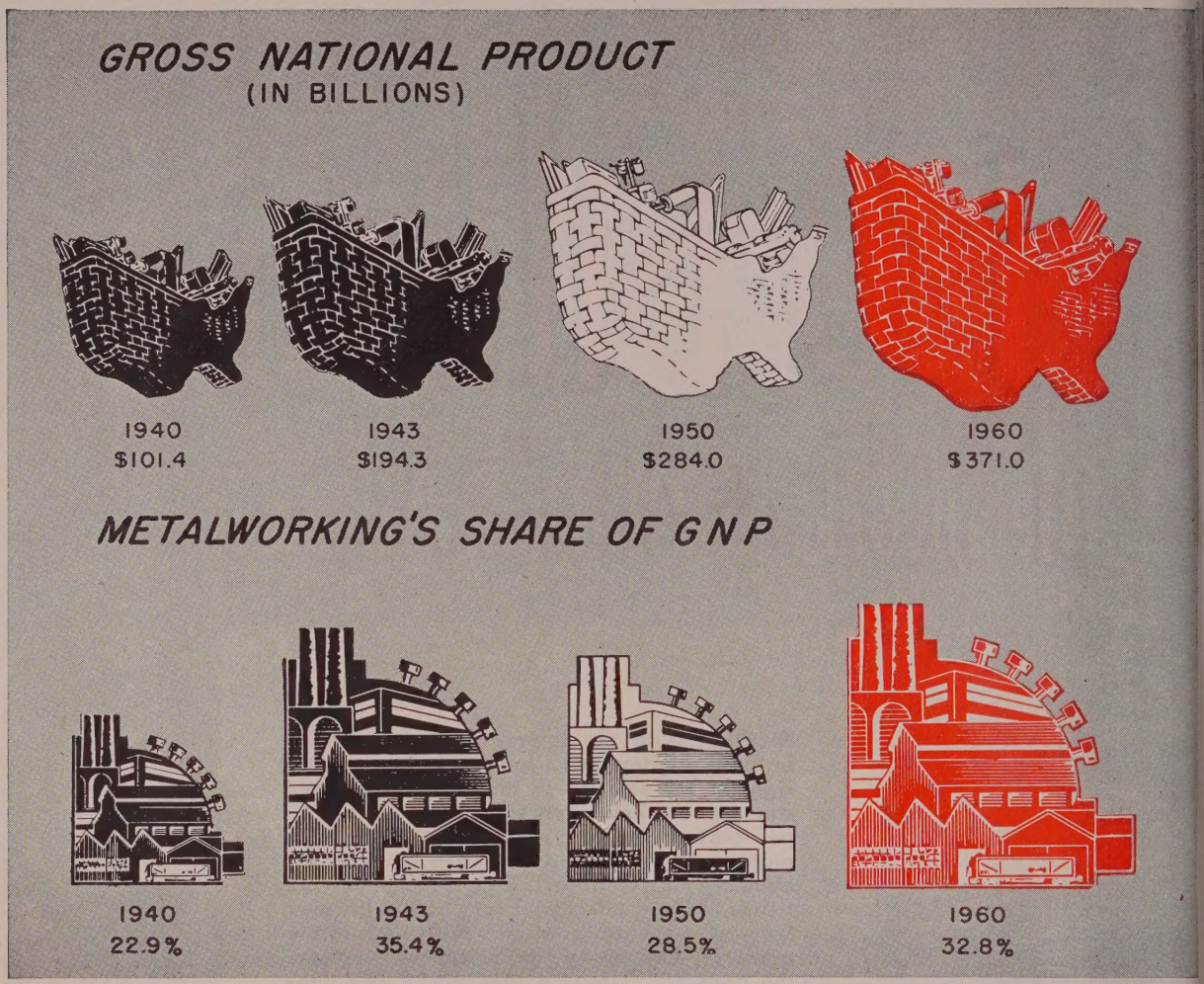
EDITOR-IN-CHIEF

$120 Billion

Metalworking Market Ahead!

● **WHAT'S in the future for metalworking? In these warring times, industry men may lose sight of the promise of the future—that they can expand their physical sales by nearly 50 per cent in the next decade, provided their plants aren't materially damaged by invasion, bombing or sabotage. Here STEEL analyzes trends likely to affect your company in the next ten years—what a garrison state means to the economy, how rising capital expenditures are the hope for increased productivity and production, how the climbing birth rate will bolster industrial sales. To contribute toward victory over Communism in the fifties, industry must win equitable income taxes, wiser tax depreciation treatment and reasonable price, wage and distribution controls. A $120 billion metalworking market by 1960 is possible. The future holds promise of an even more spectacular advance—and warnings of retrogression. STEEL presents its analysis of the economic cross currents in the 1950s to help you make the promise come true.**





"EXPAND my plant? Why? I'm doing 40 per cent better than I did ten years ago. I've no worries." So says Robert Wolfe, owner of an Illinois metal fabricating plant.

He would not be so complacent if he realized industry generally has expanded in physical volume by 64 per cent in the past ten years. He is out of step. At this rate, he'll be way behind in another ten years, for by 1960 industry generally will improve its physical volume another 31 per cent—war or no war. Metalworking will do even better—48 per cent.

In Step?—Have you kept up with the parade in the past decade? What plans have you made to stay in step for the next ten years? Gross national product (GNP)—economists' term for the dollars you and everyone else in the U. S. get for goods and services—will climb from $284 billion now to $371 billion by 1960 (in terms of 1950 dollars). Metalworking sales—iron, steel and nonferrous products; electrical and nonelectrical machinery and equipment; autos and related equipment, and other kinds of transportation equipment—will jump from $81.5 billion in 1950 to $120 billion in 1960 (in terms of 1950 dollars). And that's conservative. The $38.5 billion gain seen for the 1950s compares with a physical volume increase in metalworking sales of $41.7 billion in the 1940s. Mr. Wolfe didn't get his share in the forties, nor will he probably get it in the fifties. Will you? To figure what your share should be, calculate your sales target for 1960 (in terms of 1950 dollars) by using the chart on pp. 88-89.

These figures and others to come for 1960 are estimates based on consolidated opinions of metalworking executives, bankers and economists both in industry and government whom STEEL has consulted. STEEL makes the assumption that industry will be producing to the limit for allout defense. The estimates hold unless the nation's metalworking plant is materially damaged by invasion, bombing or sabotage.

Unsteady—Metalworking's climb to 1960 won't be steady. There will be sloughs and peaks. The inevitable government controls on industry may snarl metalworking activity in 1951 to such an extent that total sales will drop below the 1950 level. Some nonessential civilian production is certain to be curtailed this year; military ordering will not immediately fill the vacuum. It appears 1952 will be a banner year, but a slowdown will come in 1954 and 1955 as industry pauses to catch its breath. Its second wind will come soon; after 1955, look for a pick-up in the economy again.

Probably the best to hope for in the next decade

s a fractional war economy, but that best is pretty ood. Guns and some butter, too. The metalworking ndustries will be largely responsible for that. Note he percentage ratio between metalworking sales and he GNP as indicated in the chart. In 1940, a peace ear for the U. S., metalworking sales were less han 23 per cent of the GNP. In the allout war year f 1943 the ratio bounded to 35.4 per cent, dropped o 28.5 per cent in 1950 but shall stabilize between 2 and 35 per cent for the next ten years.

World Lead—Those ratios mean this: Metalwork- ng in peace, semi-war and war is the nation's and he world's biggest industry. In war and semi-war it ustifies its role as Mr. Big by producing propor- ionately more than most other industries.

Can you see a 50 per cent climb in the physical volume of your business when 1960 rolls around? Or do you prefer not to look that far ahead? In either event, prospects point toward that figure.

Many favorable factors must combine to make it o. A few can be missing and the increase will still ome. But two compensating elements must be pres- nt: Increased output per man-hour to produce more goods and increased markets—people—to buy the goods. Are they on the increase? Yes, says Vergil D. Reed, associate director of research for J. Walter Thompson Co:

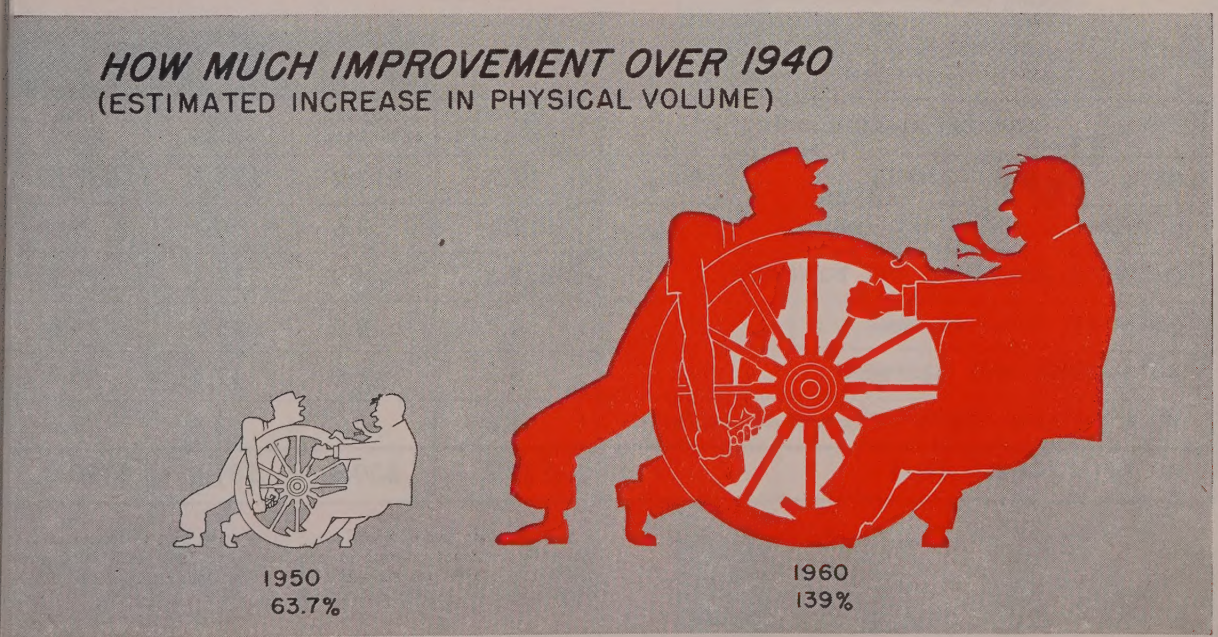
"A hundred years ago the average American work- r put in 70 hours per week and produced just over 25 cents' worth of goods per hour. Today he works about 42 hours per week and produces more than $1.40 worth of goods per hour (in constant dollars). His output per man-hour, in actual goods, has in- creased five times in 100 years, roughly 20 per cent per decade. This average output per man-hour we call productivity."

Higher and Higher—Productivity since the war has been increasing. For industry generally it is now climbing at the rate of about 2.2 per cent a year. The metalworking rate is even higher, perhaps 2.7 per cent a year, according to Department of Labor's statistics. A 2.2 per cent increase per year compounded for ten years means a 24.3 per cent increase in the tenth year over the first. A 2.7 per cent increase per year compounded for ten years means 31.2 per cent increase in the tenth year.

Per capita productivity (GNP figured in 1950 dollars divided by population) rose from $1309 in 1940 to $1884 in 1950 and will probably reach $2196 by 1960.

The Mechanics of the Matter—Productivity does not increase primarily because workers are more zealous in their jobs. That may be one contributing factor to improvement, but better and more plant and equipment is the major reason why productivity rises. All industries have been adding to their basic plant and equipment at an unprecedented rate since the war. They will accelerate the tempo even more for the next five years. In 1948, the U. S. had about $442 billion worth of plant and equipment, or about $7265 per employed worker. From 1936 to 1940, $28 billion was spent for new plant and equipment. Some $86 billion worth of equipment for production was installed from 1946-1950. The capital expenditures chart on p. 90 shows what we'll be spending on facilities by 1960. Estimated expenditures (in 1950 dollars) for the next five years are: $22 billion in 1951; $22.5 billion in 1952; $22.8 billion in 1953; $19.5 billion in 1954; and $17.0 billion in 1955. The decade low will come in 1955; then expenditures will rise again to 1960.

But productivity isn't the whole story in production. What good is productivity if you don't have the men to do the job? The labor chart (p. 91) shows the labor force will probably increase by 11.7 per cent in the next ten years. It increased 14.6 per cent from 1940 to 1950 because of population gains, more women in the labor pool and more part-time workers. Be-



Pick Your Sales Target for 1960

Here's a three-step way to find out what sales volume you should be shooting for in 1960. Follow the three simple steps listed below. You may be helped by the example of the ABC Mfg. Co., a typical metal-working firm

STEP 1—Pick the industrial classification in which your com pany falls on the table below. ABC Mfg. Co., for exampl is in the electrical machinery and equipment industry, sal for which are plotted from the figures in the table for th electrical machinery and equipment classification. The sal line for the classification is already plotted on the facin page (heavy black line). It was plotted from the figur under columns A, B and C in the table, *using the scale at th right of the chart.* If your company is in the same classific tion, you have been saved one step and need not plot the i dustry line. Since the scale at the right begins at 4, t nonferrous and transportation equipment industries' sales lin must be plotted farther up on the scale at the point whe the digits 2 and 3 occur. Essentially you are putting a de mal point after the first digit in either case.

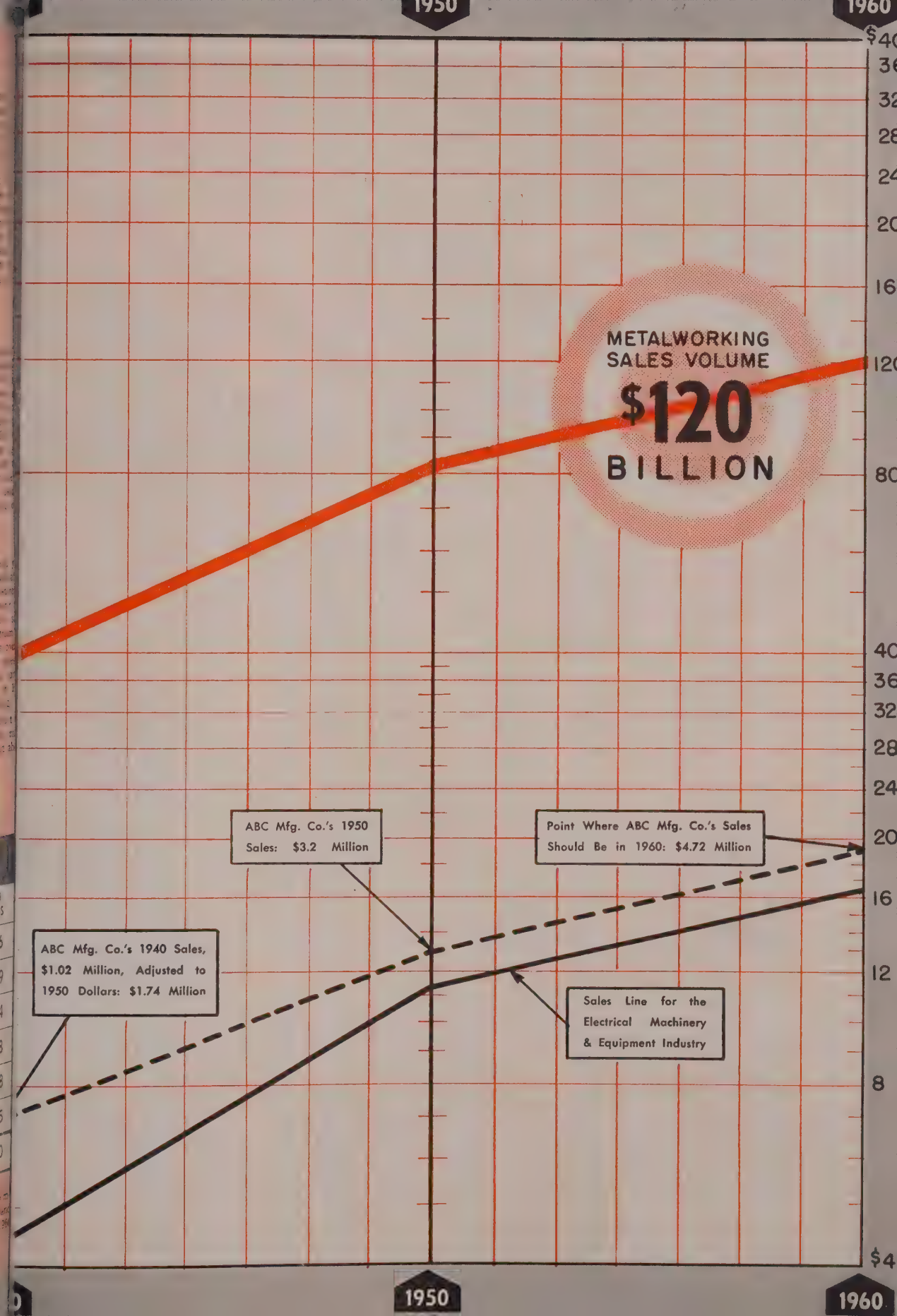
STEP 2—Next, plot your own company's 1940 sales point the chart, but do not use the dollar figure that appears your financial statement; instead mutiply that 1940 sa figure by the factor, 1.71, to take into account inflation sin 1940. *Use the scale at the left to plot that point.* (You m even decide to use your own inflation factor; that's all rig it won't affect the use of the table and the chart.) ABC M Co.'s sales in 1940 were $1.02 million (adjusted, that fig becomes $1.74 million). In 1950 ABC Mfg. Co.'s sales w $3.2 million. Both points and the line joining them are ready plotted on the chart; *the scale at the left was used plot the points.* Plot your own 1950 sales figure the same w

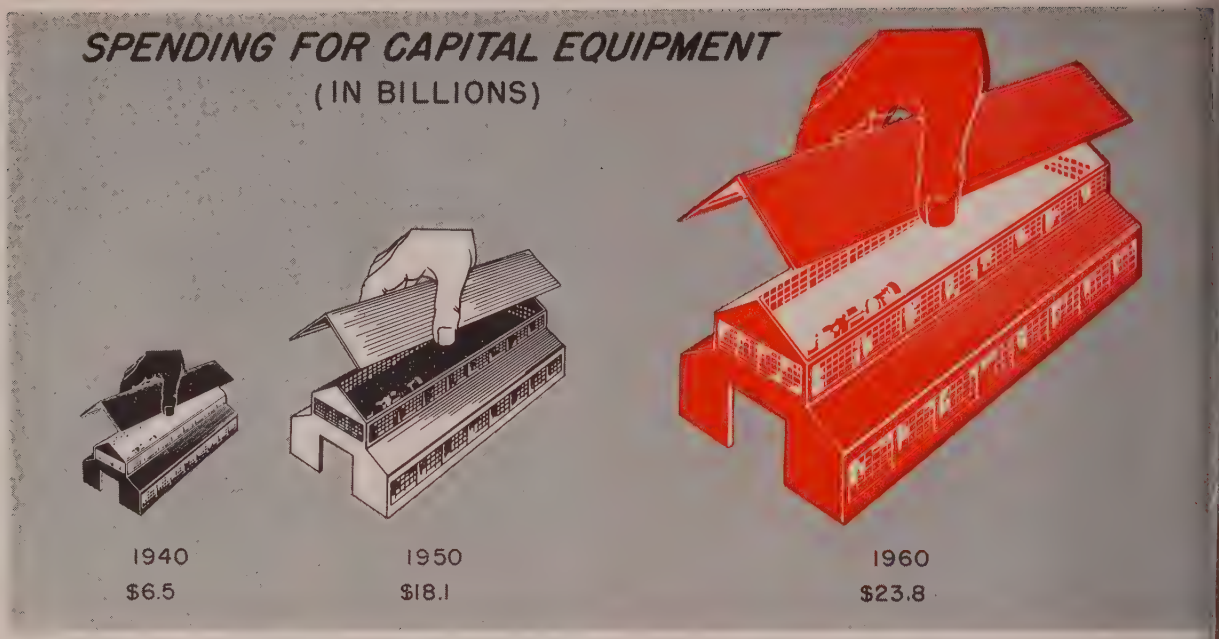
STEP 3—To get your own 1960 sales estimate, extend y own sales line from 1950 parallel to the industry classificat in which your business falls. ABC Mfg. Co.'s line—alre plotted—was drawn parallel to the electrical machinery equipment industry classification line. ABC Mfg. Co.'s s in 1960 are estimated at $4.72 million *which is read from scale at the left.* Other companies with sales points coi dent to ABC Mfg. Co.'s 1960 sales point might have sale $47.2 million or $472,000. Your sales projection is sol similarly. The solution will give you a sales target in 1 dollars—if you keep pace with your industrial grouping.

Your own bootstraps—aggressive selling, fertile product velopment, manufacturing competence and resourceful m agement—can put you above the industry average and ah of competitors.

INDUSTRIAL CLASSIFICATION	ACTUAL 1940 SALES	A ADJUSTED* 1940 SALES	B 1950 SALES	C 1960 SALES
IRON, STEEL AND PRODUCTS	$7.7	$13.2	$25.5	$37.6
NONFERROUS METALS AND PRODUCTS	2.1	3.6	6.7	9.9
ELECTRICAL MACHINERY AND EQUIPMENT	2.5	4.3	11.1	16.4
MACHINERY (Except Electrical)	4.7	8.0	16.9	24.8
AUTOMOBILES AND EQUIPMENT	4.7	8.0	17.5	25.8
TRANSPORTATION EQUIPMENT (Except Automobiles)	1.6	2.7	3.8	5.5
ALL METALWORKING SALES	$23.3	$39.8	$81.5	$120.0

* To take into account inflation since 1940 and to better com pare the physical volume of production in 1940 with 1950 an 1960, 1940 sales are adjusted to a 1950 dollar base. All 196 dollars will be expressed in 1950 dollars.


1950
1960
$40
36
32
28
24
20
16
120
80
40
36
32
28
24
20
16
12
8
$4
METALWORKING
SALES VOLUME
$120
BILLION
ABC Mfg. Co.'s 1950
Sales: $3.2 Million
Point Where ABC Mfg. Co.'s Sales
Should Be in 1960: $4.72 Million
ABC Mfg. Co.'s 1940 Sales,
$1.02 Million, Adjusted to
1950 Dollars: $1.74 Million
Sales Line for the
Electrical Machinery
& Equipment Industry
1950
1960



tween October, 1949, and October, 1950, civilian employment went up 1.1 million; 800,000 of them were women. Average age of workers will increase in the next decade. Men and women aren't as eager to retire at 60 or 65 as first thought. The length of the work-week, too, affects production. The work-week in a garrison state will probably rise to 42 hours, or a little more.

A greater work force, metalworking's capital expansion and continuation of the 40-hour week are among other factors which will boost the production improvement to nearly 50 per cent.

That elusive thing called productivity, end result of better machines and better tools, not more muscle from their operators, will turn the production trick. Better look to the health of your aging equipment.

Cause and Effect—So, the means of producing more are in sight. What about the markets—people—to support more output? One of the pleasant surprises in a postwar world full of many nasty surprises is the growth in population. Bureau of the Census figures in the chart on people indicate that population increased 14.4 per cent from 1940 to 1950, and that, conservatively, it'll jump 12.1 per cent in the next decade. The increase during the war years of the 1940s and immediately afterward is not unusual but the sustained growth now is surprising students of the subject. The 168.9 million figure for 1960 is Census' middle projection. The bureau's low estimate is 161.2 million; its high, 179.9 million.

A moderate 12.1 per cent increase, then, should mean at least about a 12.1 per cent increase in your metalworking market potential. Actually, it means far more than that.

Backbone—Consumer buying—directly or indirectly that's metalworking's meat—is done on the basis of a family rather than an individual. A family, whether it has six or three members, usually has one car, one house, one each of most home appliances. About 40 per cent of the present families have been formed since 1940. The chart on people shows that population increased 14.4 per cent between 1940 and 1950, but that the family rate increase was 27.7 per cent. In 1930 the American family averaged 4.1 persons; in 1940 3.8; in 1950, 3.4. The family size will probably hold at about 3.4 for the next decade.

But people and families without any money mean little for metalworking markets. If people and families alone meant anything, China and India would be the most powerful nations on earth today. How are the American bank accounts and other savings?

The Residue—Disposable personal income after taxes in 1950 exceeded $200 billion. It will be 30 per cent higher by 1960, as the chart on p. 93 shows. About $78 billion of the 1950 disposable income is dissipated through inflation and cannot be added to improvements in the standard of living since 1940. But, after correction for prices, the real purchasing power of American consumers in 1950 was 60 per cent greater than in the highest prewar year, 1940, and 9 per cent greater than in 1949. In 1920 the real purchasing power of the people was 1 per cent under what it had been in 1913.

That's not the whole story of personal income. Arm H. Johnson, vice president of J. Walter Thompson Co. shows how a shift in distribution of income means much to metalworking. In 1941 only 1,564,000 families had incomes over $5000 before taxes. Now 6,240,000 families have incomes over $5000 after federal income taxes. Ten years ago 5,703,000 families had incomes over $3000 before taxes; now 21,320,000 have incomes over $3000 after federal taxes.

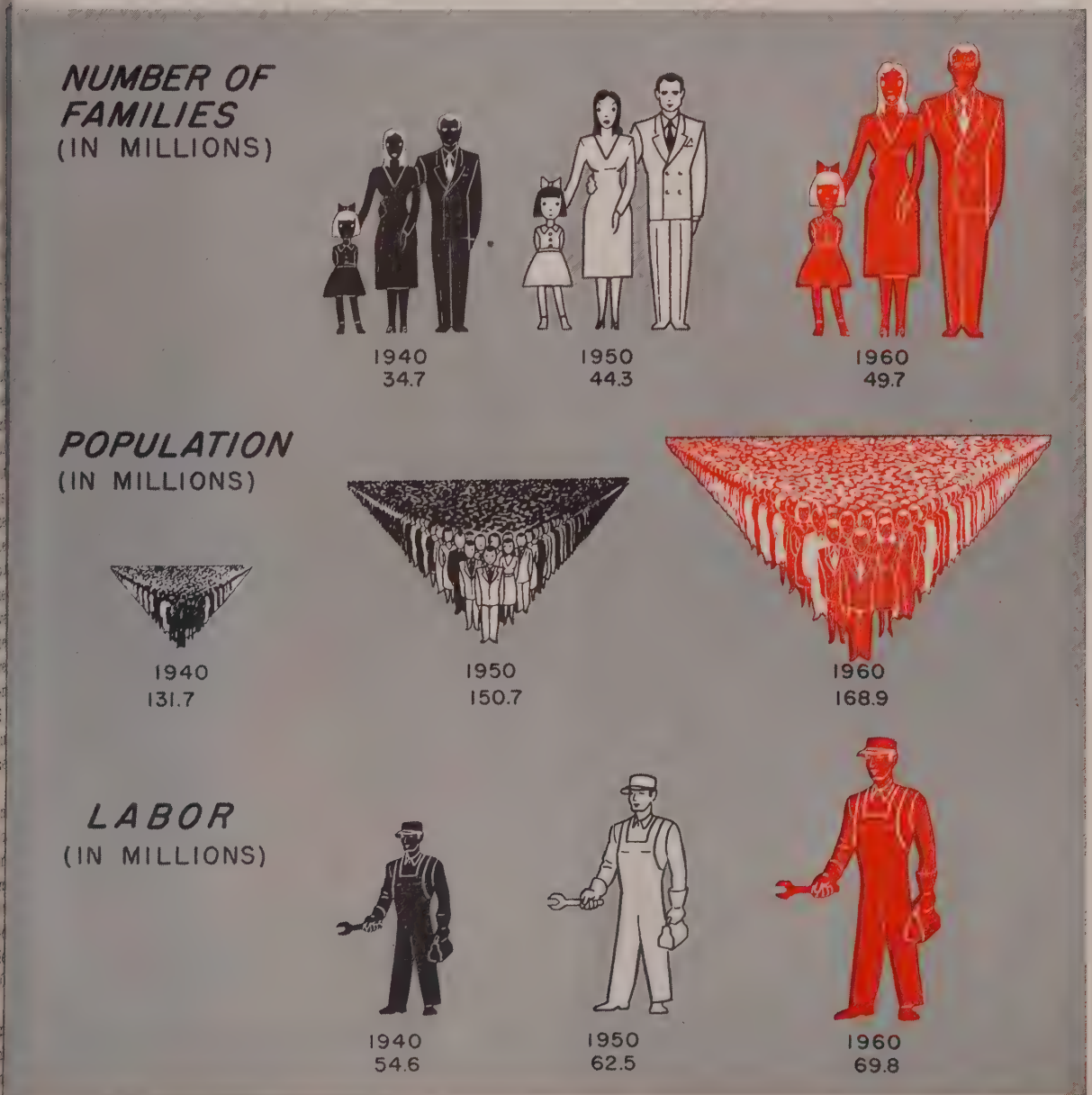
On Credit—Current personal income is only one support for buying. Despite government regulation, credit buying will still mean a lot to metalworking sales. Personal consumer credit stands at $19.4 billion

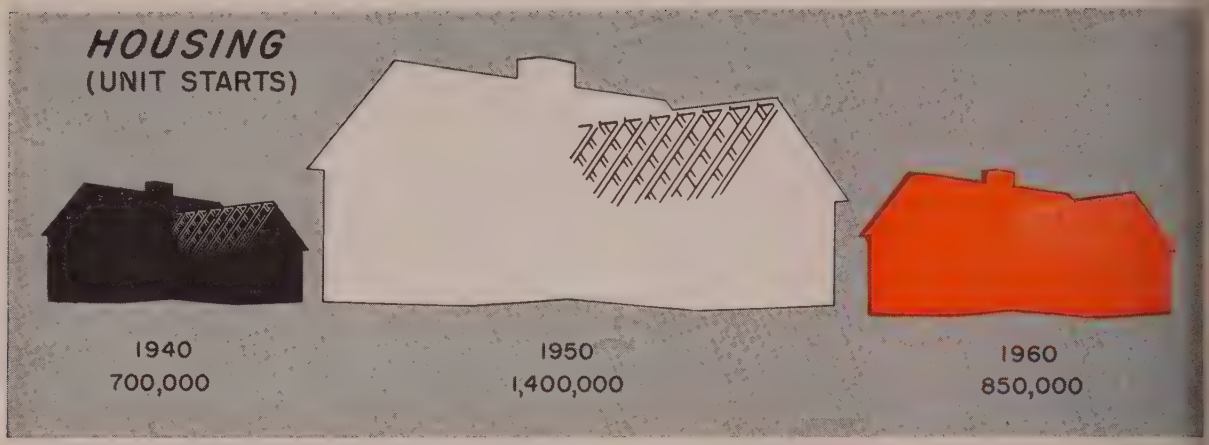
hat's more, people have money salted away in bank counts, war bonds, etc.—what the economists like call "discretionary purchasing power."

Savings bond maturities will reach a peak of over billion a year in 1954 and 1955. Nearly $30 lion of those bonds mature from 1950-1955 and be- een $5 billion and $6 billion mature each year from 56-1959. About half of all families have some nds. Even if new savings bonds are sold each year equal the maturities, the effect is a revolving fund more than $5 billion annually in the hands of nsumers adding to the turnover of the current rchasing power.

A House to Live in—More families mean more uses and houses mean big markets for metalwork- g. Residential construction was a bulwark of the om in early 1950. It will be a bulwark for the xt ten years even if government controls put a damper on building years like 1950 when 1.4 million houses were started (see p. 92). In a fractional war economy, the government isn't likely to throttle the starts to below 700,000 a year. Probably 800,000 or so will be built annually in most years of the next decade.

Slow Change—There will be no technological revolution in housing in the next decade. Rather there will be an evolutionary change that will take two tacks: 1. Greater attention to architectural details contributing to better livability—adequate living area, adequate storage area, private outdoor area and a basement or equivalent; 2. Standardization of designs and materials. No. 2 is a more likely development than widespread prefabricated housing in the next ten years. The job is to educate architects to standardize on designs and materials to use materials more efficiently. The materials—metals, brick, wood—will





remain about the same as they have been.

So, the markets—people—are ready to buy. The people will be staying longer, too. A boy born in 1850 could expect to live to 38.3 years. A boy born in 1950 can expect to live 65.5 years; a boy born in 1960 can expect to live to 69.6 years. The distaff side has a life expectancy at birth about 4 years greater.

Guns and Business—More factors put a solid floor under metalworking demand. One is national defense. The chart shows estimates for durable goods expenditures—tanks, guns and such equipment—through 1952. In 1952, those expenditures will account for 13.2 per cent of the gross national product—no drop in the bucket.

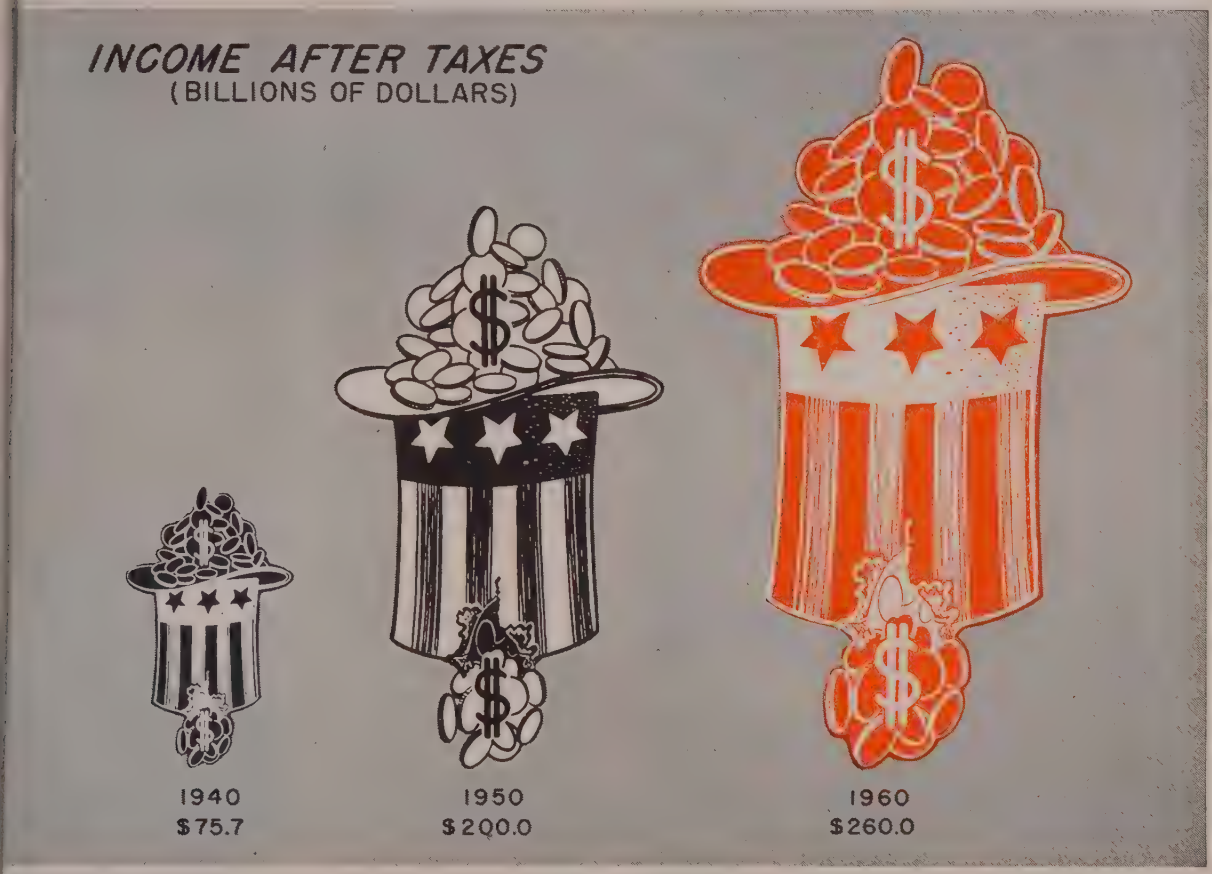
Harvard economist Sumner H. Slichter puts the cost of the fractional war with the Communists at a minimum of $18 billion a year for years to come. That's in excess of "normal" defense costs which totaled about $14 billion in fiscal 1948. His minimum looks low since the Chinese started their aggression. Boost the figure to $25 billion. By next summer, total defense spending will have hit a rate of at least $35 billion a year. Appropriations will be higher than that, but military procurement will lag. Non-defense federal spending will be cut a little, but it will stay above $25 billion a year, to boost the total federal budget to over $60 billion in the next year or two. Leon Keyserling, head Washington economic adviser, says the total federal budget may reach $75 billion by 1955.

Tough Target—Mr. Slichter thinks industry will have to boost its productivity by 4 per cent instead of 3 a year to win the conflict with the Reds and to keep the American standard of living high. Industry has boosted productivity 4 per cent a year in isolated years, but it has never done so every year for a sustained period.

Another factor reinforcing demand for metalworking is general industrial expenditures for new plant and equipment. And metalworking will have a disproportionate share in the GNP for the next decade because it makes virtually all the capital equipment for industries manufacturing everything from paper

automobiles. Metalworking grows with compound terest when all industries expand.

Juggling Act—"It's of special importance," says Mr. ichter, "that the outlays on defense and foreign l shall not retard the replacement and increase of r industrial plants and equipment, as did World ar II." During 1942-1945 only 3.8 per cent of the tput of the country was used to replace and expand ivate plants and equipment, in comparison with per cent each year in 1939-1941 and more than 10 r cent a year since 1945. Mr. Slichter thinks that o win the production contest with Russia, the U. S. should continue to use at least 10 per cent of its output to improve and enlarge its private industrial plant and equipment."



So the portents are good for another giant step in metalworking. Its national plant produced $39.8 billion worth of goods in 1940, $81.5 billion in 1950 and can turn out $120 billion worth in 1960 (in terms of 1950 dollars).

What could throw a monkey wrench into everything? A catastrophic World War III—with the U. S. konked nearly out in the early stages—would wreck everything, including predictions.

Danger Point—Perhaps as dangerous a monkey wrench is inflation. The consumer price level has risen nearly 75 per cent since 1940, 5 per cent since 1949. Chances are inflation will continue for a decade because of government deficit spending, the garrison economy and union props under high wages. Sound thinkers don't like inflation, but they feel it's not too dangerous if kept below 3 or 4 per cent a year.

Excessive government controls can ruin economic prospects. A managed economy is like an automobile. They both probably can go along all right if the driver knows what he's doing. If our economy becomes more and more managed, will the drivers know what they're doing?

Taxed Out of Business—Excessive taxes will ruin economic prospects. Industry may have shoulders broad enough to carry the 45 per cent income tax, but what about excess profit levies? Mr. Slichter proposes: "If an excess profits tax is enacted, its tendency to retard the growth of industry should be mitigated by a provision that only part of the regular rates apply to profits spent on new plant and equipment."

Total federal and state corporate income taxes were $2.9 billion in 1940, probably will be about $17 billion in 1950. The total federal and state personal income tax take in 1940 was $2.6 billion. It will be about $20 billion in 1950. The grand total of federal and state corporate and personal income taxes was $5.5 billion in 1940, but will be about $37 billion in 1950.

Overhaul—Not only will excessive taxes put a crimp in metalworking's performance in the 1950s, but the wrong kind of taxes will be just as serious.

Industrialists and most economists agree that federal tax depreciation policies need a thorough overhaul. The new provisions for five-year amortization of defense facilities will help some, but use of this expedient is like applying patent medicines when surgery is needed.

In the fractional war economy shaping up, more and more difficult will become the job of determining what is a defense facility and what is not. Indirectly almost all metalworking production aids defense. Civilian goods are necessary to maintain a citizenry capable of paying taxes to pay for staggering defense costs. Industrialists argue: "Why not five-year amortization for all? Or some kind of liberalized policy?"

What's the Answer—Certainly in the next decade, say students of the subject, some solution must be found to a problem in which federal tax laws and regulations force much of metalworking to write off its plant and equipment in about 20 years. Those laws keep equipment in use much too long. Our survival in the war with Communism is dependent upon production. Production is dependent upon modern equipment. Installation of equipment is determined to a great extent by depreciation laws.

Related to the depreciation problem is another headache which could reach migraine proportions in the next decade if not remedied. Groups such as the Machinery & Allied Products Institute say industry has only itself to blame for a poor re-equipment policy. Only since the end of World War II has there been much study of the science of re-equipment analysis. MAPI has done research on the matter and has evolved a formula to help industry determine the best time to buy a new machine. Only a small minority in metalworking yet make use of such a formula. A good bet in the next decade is this: All companies will have to adopt at least a limited kind of scientific equipment analysis to keep up with their competitors. They may survive by using the old by-guess-and-by-gosh system, but they won't get their share of the $120 billion metalworking market envisioned by 1960.

Narrowing Base—Still another deterrent to industry expansion in the next ten years is the trend toward a narrowing ownership of industry. Today only 8 per cent of the 44.3 million families have corporate stock. Only 4 per cent have over $1000 worth of corporate stock. Only 2 per cent purchase corporate securities in a year. But the disposable personal income exists because 77 per cent of the families have life insurance, 44 per cent have savings accounts, 39 per cent have checking accounts.

Listings from 50 representative companies on the New York Stock Exchange show that the number of shareholders increased from 3,845,000 in 1940 to 4,432,000 in 1949, an increase of 15 per cent. But in that same period the number of families in the U. S. increased 27.7 per cent, nearly twice as fast.

The Reason—Why is the ownership base narrowing? One reason could be that dividends are declining, relatively. In 1939 and 1940 corporations retained 31 per cent of net profits after taxes and distributed 69 per cent as dividends, says Mr. Johnson of J. Walter Thompson. In 1948-1950, corporations on the average have retained as undistributed corporate profits 60 per cent of their net profits after taxes. In terms of 1940 dollars stock prices in the first nine months of 1950 averaged 5 per cent under 1940 levels.

Industry ownership in Britain narrowed before World War II. Much of British industry is now nationalized.

Not Enough—A labor shortage could be still another threat to metalworking expansion. But with a labor force of nearly 70 million, the situation won't be too desperate (see the labor force chart on p. 91). The Bureau of Labor Statistics of the Department of Labor admits that shortages in the skilled classifications will be a characteristic of the entire next decade. At least a partial solution to the problem can be

ore mechanized equipment into which is built the ill of the former artisan.

Strikes in the decade of the fifties? Nobody can ore than guess what the next ten years will bring, t here's encouraging note: As labor unions grow der, they become less combative. The history of e labor movement in Britain, Germany and Sweden, here it is much older than in the U. S., shows that.

Barren Ground—Depletion of natural resources? any reserves will not last if used as recklessly as in orld Wars I and II. An encouraging note is the ational Security Resources Board's reinauguration its committee for conservation.

If used wisely in the fractional war economy of ie next decade, resources will be ample through the 960s. But some—notably iron ore—will have to be ugmented or conserved by increased imports. For oth coal and iron we are already faced with the eed of finding ways to use lower grade deposits to onserve dwindling higher grade reserves.

The frantic forties saw a $41.7 billion gain in the metalworking industry's sales. Are we to deny that the fifties shall be equally fabulous in the face of vast and often unrecognized sociological changes?

Who in 1940 would have predicted that the real hysical volume of industry by 1950 would be 64 er cent greater than then? That greater produc- ion would never be consumed today if there had ot been vast sociological changes occasioned by the var and the depression. Tremendous population shifts n the 1940s made millions see how others lived. People realized for the first time in their lives that here were better ways of living. The result: A higher tandard of living and better markets.

Great Educator—Sociological events literally edu- ated millions of people to accept the 64 per cent im- rovement in their standards of living in the 1940s. n a fractional war economy of the 1950s, no com- arable sociological shift is likely. If we have World War III, our standard of living perhaps could go down, not up. So, in a fractional war economy, we must find ther ways of educating people to the new high poten- ials of the economy. A tremendous advertising and ale job is ahead.

In the decade of the 1950s metalworking must learn o adapt itself to a new kind of capitalism that al- eady shows hints of some of its characteristics. The apitalism of the 1950s will encompass bigger gov- rnment, bigger unions, bigger companies. Bigger ompanies don't mean less competition. In a larger economy, bigger companies will be a natural evolution o cope with new situations.

More Controls—Virtually permanent controls on some prices and means of distribution appear in- evitable in the 1950s. Some basic industries may be in for commission-type controls that now exist for communications, transportation and public utilities.

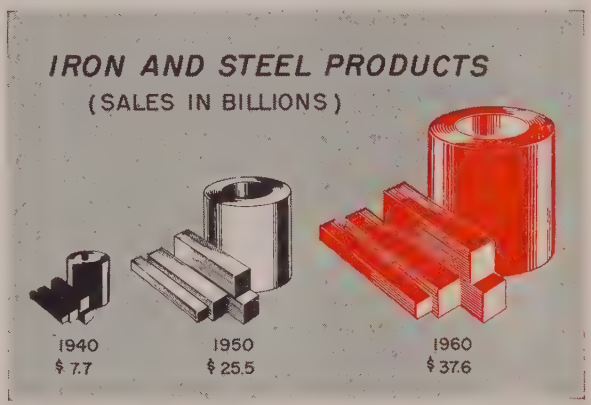
Metalworking generally will boost its sales to $120 billion in ten years, but the production gains won't be uniform among the various segments of the industry. Here's how the industry classifications will fare:

Iron and Steel: The Big Gun

Plants turning out iron and steel and fabricated products will supply $36.6 billion worth of material in 1960 (in terms of 1950 dollars). That's nearly a 50 per cent increase in physical volume over 1950. When the 1940 sales figure—$7.7 billion—is adjusted for inflation the 1960 target will still exceed it by 184 per cent.

Much of this segment's volume is accounted for by primary steel production. In 1950 steel producers made 96.5 million net tons of steel ingots and castings for an alltime record, 7.8 per cent above the previous high of 89.6 million tons in 1944. By 1952 producers will have the capacity to turn out 110 million tons. Expansion will continue through the remainder of the decade. Government pressure is forcing some of the expansions.

Tight as Ever—Steel supplies in 1951 will be as tight as in 1950 because few of the major steel industry expansions will be in full operation until 1952



and because the military will get more of the material. Virtually every steel company in the U. S. has major expansions afoot, helped by five-year amortization.

World events are certain to force greater use of steel in 1951 than in 1950 for military and collateral consumption such as freight car building and expanding power plant facilities. But there's hope for steel users whether we find ourselves in allout global war or in sporadic armed conflict. Even in the peak of World War II, no more than 38 million tons went to military and allied uses. An average of about 25 millions tons went for those purposes during the World War II years. In 1942, 1943 and 1944 average annual steel production in the U. S. was 88.1 million tons. In the coming decade, a good estimate is that steel production will average at least 110 million tons a year, 22 million tons more than in the World War II years when we fought a global war and also raised our standard of living to unprecedented heights. We can count on added help in steel supplies from Europe next year, barring Russian invasion.

In Training—Today, America's industrial plant is in better shape than in the early days of World War II to make the goods for rearmament. The hasty expansion of facilities which occurred in the early 1940s

and which required so much steel doesn't need to take place in the early 1950s even if we get into a global conflict.

The military situation in the 1950s may necessitate a vast road-building program that was not needed in the 1940s to fight World War II. If so, such a program would take staggering tonnages of steel. Shipbuilding is certain to pick up in the 1950s, although it would have to recover a long way to regain its World War II steel-consuming status.

In Reserve—The steel industry has the iron ore situation well in hand with beneficiation developments in the Mesabi area and new deposits opening up in Labrador and Venezuela. More serious than the possible shortage of ore is scarcity of elements vital in production of alloy steel which accounts for about 12 per cent of all steel output. Cobalt, colombium, manganese and nickel are particularly tight. India, one of our most important sources of manganese, is vulnerable to Communist aggression.

Steel prices will continue to creep up in the coming decade. Base prices of finished steel have risen about 67 per cent since 1940, a little less than average consumer prices.

Nonferrous Shortages Threaten

Producers of nonferrous metals will do $9.9 billion worth of business by 1960 (in terms of 1950 dollars) compared with $6.7 billion in 1950. The industry will be hampered by the most serious materials shortage —particularly in copper, lead and zinc—of any metal-working classification.

Subsidized—A government subsidy plan for marginal producers of those metals may have to be adopted in the next decade to solve the problem. It probably would be based on the workable plan set up during World War II when 3591 copper, lead and zinc producers participated and helped meet defense needs. That such a program is not far off is indicated by the recent establishment of Defense Minerals Administration, a federal agency that probably will administer some premium price program.

The U. S. is becoming increasingly dependent on foreign sources for its metal needs; that development will be a serious liability in the decade ahead when fractional or allout wars may cut off supplies. Once a leading exporter of copper, the U. S. is now a net importer.

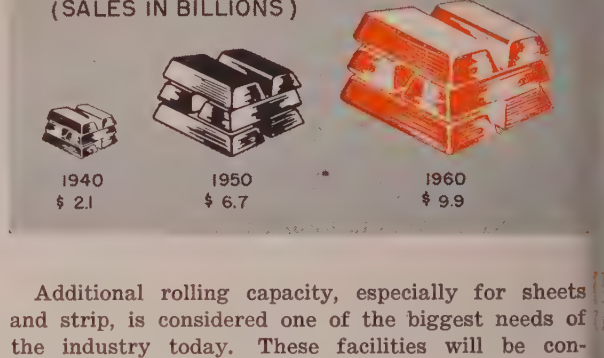
Here's the outlook among other major nonferrous metals:

Aluminum — United States aluminum producers stepped up primary aluminum production by 18 per cent from 315 million pounds in the third quarter of 1949 to 372 million pounds during the third quarter of 1950.

Domestic producers plan to expand annual capacity by 1 billion pounds. When this expansion is completed in the next decade, total primary aluminum capacity in the United States will be seven times as great as it was at the beginning of 1940. Alcoa, Reynolds and Kaiser have announced plans for 399,000 tons additional production per year, including 79,000 tons to be obtained from reactivated plants and 320,000 tons from new facilities. These producers have obligated themselves to sell in the open market up to two-thirds of the metal produced in the new plants for a period of five years. They also agree that for a period of 15 years following the initial five-year agreement that they will offer 25 per cent of the production of their new plants to users of aluminum who have no primary producing facilities of their own.

Magnesium—The spectacular expansion of magnesium production facilities during World War II will take care of all foreseeable needs for many years ahead. Up to late 1950 Dow Chemical was the sole producer of magnesium, with output of about 4 million pounds a month. Its Freeport, Tex., plant was operating at only about 50 per cent of capacity. It is now operating at 100 per cent and six government plants closed since the last war are rapidly being reactivated.

The six have a total capacity of slightly under 200 million pounds a year. The raw materials used in the manufacture of magnesium are almost limitless, an important source, of course, being seawater.



Additional rolling capacity, especially for sheets and strip, is considered one of the biggest needs of the industry today. These facilities will be constructed as expansion of the markets continues to progress.

Use of magnesium in civilian goods just began to gain a strong foothold when the Korean war forced a diversion of large tonnages to military uses, such as in airplanes and portable radar equipment.

Titanium — Titanium emerged during 1950 from laboratories where a comparatively few pounds of commercially-pure metal had been produced in the preceding two years. By the fall of 1950, commercially pure titanium production had risen to an annual rate of some 60 tons. Look for a large increase over the 60-ton figure by late 1951. Costs are still high compared with those for the other nonferrous metals.

Improvements in production methods are expected to be developed soon, permitting reductions in selling prices and a corresponding expansion of its application in commercial uses. For 1951, requirements are estimated at 5 million pounds for civilian, military and atomic uses. Some 9 million pounds may be needed by 1952. Titanium, like magnesium, will have a spectacular production increase in the next decade.

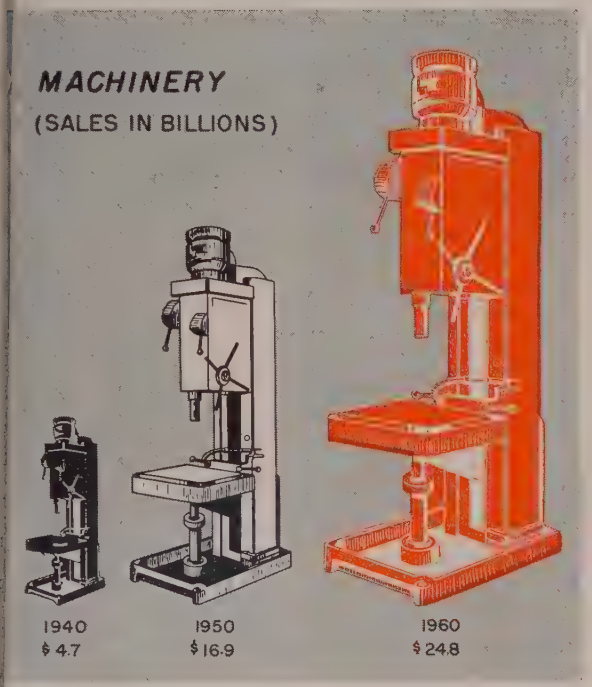
Machinery Sales Lively

Builders of machinery, except electrical, will do as ell as any segment in metalworking during the next cade if a fractional war economy prevails. They ill have sales of $16.4 billion by 1960, a 50 per cent crease over 1950.

The Reason Why—If you make machinery, except ectrical, your sales should jump 50 per cent by 60 because of these factors:

1. In the next decade, we will not only need better achinery but more of it to meet expanding demands. us, machinery makers have a double market to ost their sales.

2. Five-year amortization for defense facilities al-



eady permitted by the government and other liberal-zed depreciation policies almost certain to follow vill stimulate machinery sales.

3. Higher wages will spur sales, to lower production osts.

4. Industry is becoming conscious of the need for cientific analysis in surveying its equipment needs. Machinery & Allied Products Institute, National Ma-hine Tool Builders' Association and other groups are rawing attention to the myths that overly influence urrent buying policies of many companies. As scien-ific analysis gains headway in the next decade, it vill mean more equipment sales.

Behind the Scenes—The design of machinery in the ext ten years will be influenced by three require-nents: The need to save production materials, man-ower and floor space. Machines that generate as ittle scrap as possible will get the biggest sales. That means equipment which pushes production ma-erials into shape will get a bigger play than ma-hines which cut metal. Built-in gaging systems will e common to control quality.

The manpower problem will be licked with conveyor tie-ins from machine to machine—refinements of "automation." More machines will combine several processes. Floor space requirements will dictate more compact designs.

Trends in special purpose machinery—for textile, rubber, paper, printing, woodworking and steel industries—will follow those for general machinery, with some exceptions.

More Competitors—Makers of textile equipment must buck more foreign competition than builders of any other type of machinery. British producers have a strong position in the American market. Makers of equipment for rubber, paper, printing and woodworking industries all are working toward heavier, more accurate machinery. Makers of steel mill equipment think they, particularly, will be aided by five-year amortization and more liberalized tax depreciation policies. Those manufacturers are tied in closely with the steel industry. They'll be getting re-equipping contracts, but much of their business will come from the steel industry expansion. They foresee their busiest time in the next five yars. Steel equipment exports will decline because foreign countries are developing their own engineering industries and because the cream has been already skimmed in that market. That will be a dampening factor: 20 per cent of some companies' business is for export.

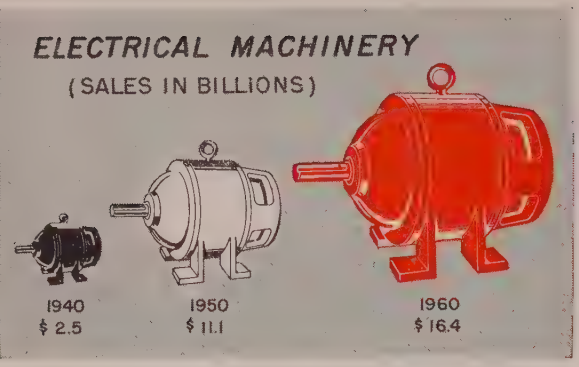
The export situation will be increasingly difficult for the machinery industry generally in the next decade. More competition from foreigners is even likely in the domestic market, particularly from Switzerland in extra-precision equipment. Machinery prices won't come down. That will keep the used machinery markets humming. More common will be the practice of rebuilding and regrading machinery in the plant.

Electrical Equipment Makers Ready

If you make electrical machinery and equipment, your industry turned out $11.1 billion worth of goods in 1950 and will do nearly 50 per cent better than that by 1960 when $16.4 billion should be produced (in terms of 1950 dollars).

Good Performer—Of the two bulwarks of electrical equipment industry — electrical capital goods and home appliances—the capital goods producers will improve the most in the next decade, a little more than 50 per cent. The demand for this type of equipment follows the utility industry's estimated kwh sales. The chart (p. 99) shows sales of 475 billion kwh by 1960 will be 70 per cent above estimated kwh sales of 279.7 billion in 1950. The 1950 level is 12 per cent above 1949. By 1955 kwh sales will approximate 389 billion. Industrial power sales by mid-1951 may climb nearly 20 per cent above the level for the comparable 1950 date. Residential sales likely will increase 10 to 15 per cent. The expected new 1951 peak in power requirements, assuming steadily expanding direct and indirect military production, will possibly exceed the 1950 peak load by 12 per cent.

The utilities ordered about 11 million kw in generating facilities in 1950, a new record. Purchases in 1950 exceed production by 33 per cent. Today, the



utilities have on order an estimated 19 million kw in generating equipment. Generating equipment orders will drop to 6 million kw in 1951, a 45 per cent dip from 1950, but ordering will revive again by 1953.

Barometer—Some economists and metalworking men consider the power output one of the best measures we have to indicate the real growth of industry because power consumption is so closely related to general industrial production. In some ways, economists say, it is superior to the Federal Reserve Board's industrial production index whose weightings change from time to time. Thus, that index does not show as consistent a picture of growth as does power output.

Highest estimate for the FRB index is 270 by 1960. More conservative projections range from 250 to 260. A trend in the past few years is for the index to lag behind other economic indicators.

Way Behind—Over the next two years, electrical apparatus producers won't be able to keep up with demand. Westinghouse deliveries on such equipment average 12 months. In 1951 about a third of the industry's capacity will go for direct military needs. Most of the remainder will be for indirect defense requirements.

Makers of electrical capital goods are already hard hit by skilled labor shortages. Paradoxically, that situation is expected to improve a little in the next few years as employees in non-essential industries shift to essential work. The labor supply by 1955 and 1960 is expected to be adequate to meet the projected production.

Controls Again — Raw materials shortages and credit restrictions are expected to force a 20 to 30 per cent reduction in the physical production volume of home appliances in 1951, compared with 1950. That's not as drastic as it sounds because 1950 was a record year, with sales 20 to 30 per cent above the previous peak in 1948. The 1950 sales exceeded the 1949 level by about 40 per cent.

The cutbacks will be the most severe in television sets, dryers, and dish washers. Production of lamps probably will not decline. The 1952 output rate will be about the same as in 1951.

Good Omen—Appliances sales will be sustained at relatively high levels in the next decade if we function in a fractional war economy. Potential demand is still tremendous. Saturation of the present television market is estimated at about 25 to 30 per cent; electric clothes dryers about 0.5 per cent; electric ranges about 20 per cent; electric water heaters about 10 per cent. By 1960 the saturation point is expected to reach 85 or 90 per cent for television, 35 to 40 per cent for clothes dryers and ranges; and 25 to 30 per cent for water heaters.

Auto Picture: Bright Despite Controls

If the old saying "money talks" still means anything, you get one frank statement of the auto industry's confidence in the future from Ford Motor Co.'s decision to spend at least $1 billion for expansion and improvement of facilities over the next three years. Since 1946 expenditures went $100 million beyond a $500 million five-year budget.

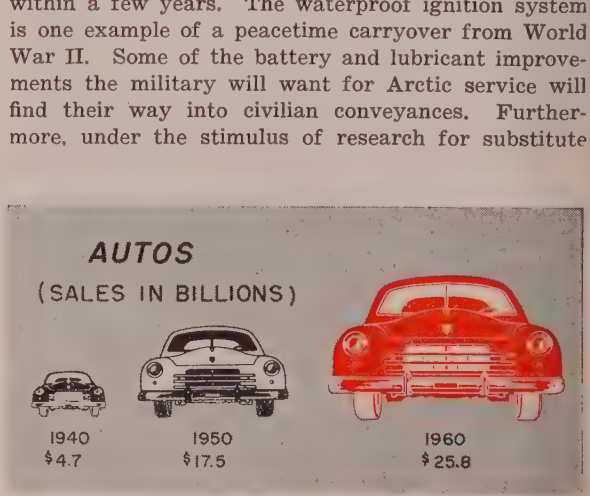
Ford officials aren't laying this on the line without having good reason to think an expanding car market will be waiting. They and every other car maker have economic experts working on population trends, watching growth of car usage, checking on spending habits for one purpose—to find out how many cars they should produce to keep abreast of the competition or to go it one better.

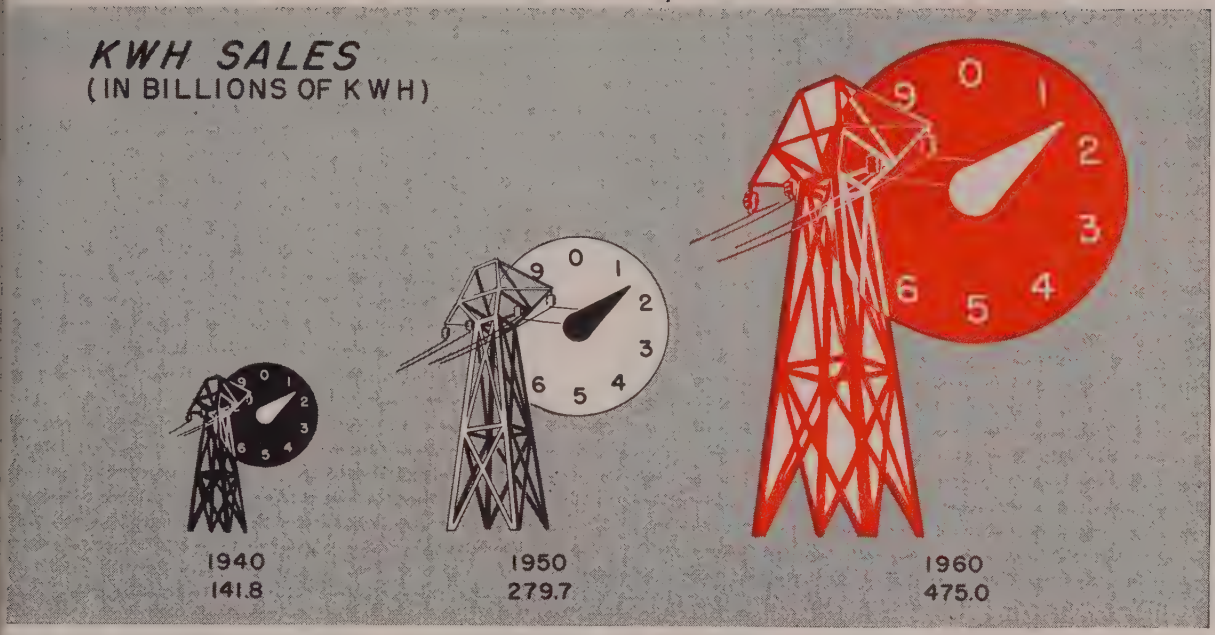
Creeping Up—Despite last year's amazing record of production, the average age of cars has increased. Forty per cent now are at least ten years old. This, in itself, points to a replacement market of unequalled proportions. The trend toward two-car ownership, accelerating further last year, is of even more significance over the long term. A generation hence, some contend, all families will have two cars; by then there may be 70 million cars on the roads, against 49 million now.

In the coming decade, automobiles will continue their evolutionary changes, although engineers are not writing off the possibility of revolutions in power plants. More emphasis on high-compression engines will be evident this year. Interest is perking in V-6s, "pancake" opposed piston engines and in gas turbines. Diesels are on the move.

Mechanical Guidance—Introduction of power steering on passenger cars this year may presage a trend as easily discernible in ten years or less as that now well established in automatic transmissions.

Experience in designing and building new military vehicles will undoubtedly show up in passenger cars within a few years. The waterproof ignition system is one example of a peacetime carryover from World War II. Some of the battery and lubricant improvements the military will want for Arctic service will find their way into civilian conveyances. Furthermore, under the stimulus of research for substitute





aterials this year, innovations may come to be accepted improvements.

New Industry Needed—Adoption of transfer-type machine tools by the industry changed to some extent the way in which it participates in the defense mobilization effort. An automobile plant becomes so highly specialized it is virtually incapable of producing anything else. Military materiel procurement to date supports this view; e.g. Cadillac to build tanks in the Cleveland bomber plant; Ford's aircraft engine program at Chicago; International Harvester's new Melrose Park, Ill., armored vehicle facility. A separate war industry, operated by famous names in motordom, may well come into being as it did in World War II.

Most decisions essential to the garrison state economy will have to be made this year, and all the implications of the condition of permanent semi-war are not yet clearly seen. The auto industry has, it feels, convinced the government of the necessity for continued passenger car, truck and bus output.

Dispersion—Motor vehicle manufacturing will continue its decentralization policy, being motivated more by economic reasons than by security. Suppliers in turn will cluster around relocated manufacturing and assembly plants. This dispersion, however, will remain confined to important labor-supply areas and will take on little or none of the aspects of the late Henry Ford's farm-and-factory experiments.

Keeping labor happy, if such is possible, will become less of a management problem than a government responsibility. A war-geared economy will not tolerate costly production stoppages. Unions will plump again for more of a voice in management in exchange for no-strike promises. The heat will be on for more profit sharing and guaranteed annual wages. The five-year GM-type contract and annual improvement factor automatically providing higher wages each year should hold such moves at least in temporary abeyance.

Trouble in Transport

A transportation system overloaded by peak peacetime burdens is due for a drastic overhauling in several of its components. Military considerations and the long-term growth expectations of industrial production will cause neglected aspects to receive prompt and thorough attention, and should be subject to critical scrutiny for years to come.

Keep 'em Rolling—Sorest spot in the transportation nerve fibers is the railroads. Logjams at rail freight terminals have vexed shippers, caused others to turn to trucks, while at the same time railroad equipment and rolling stock suppliers were atrophying from lack of business. Paradoxically an allout war effort could be handled better by the rails than a normal peace load. A five-day week idled much equipment, added substantially to costs.

Lack of freight cars received attention ranking second only to that given purely military materiel late last year. Goal of the railroads is to build up its freight car fleet to 1,850,000 units, 122,000 more than now. Some theorize 1,920,000 cars are needed to give the roads enough capacity for wartime operations. To reach the goal a 10,000-plus monthly car-building program to last two or three years is envisioned. Such a rate can not be achieved sooner than March, 1951, but will hit its stride as the turnout of components meets building schedules. Car builders now have a year's backlog of orders and by July, 1953, carriers are expected to order 267,000 new cars. Car retirements will decline from the present 72,000 unit annual rate to about 50,000 a year as the fleet is modernized.

Shakeups — Traditional freight car financing and design came in for shakeups last year. A leasing plan

worked out by insurance companies and car builders permitted the roads to order cars, pay rent on them at a decreasing rate over their lifespan. Meanwhile a close look was given Pressed Steel Car Co.'s new Unicel molded plywood cars, said to require 20 tons less steel, to cost less and to be stronger, lighter, easier to maintain, quicker to load and clean, and to permit greater payloads.

On the locomotive front, trend toward dieselization is completely established and this motive power will dominate for at least ten years. Competition from turbines, gas and coal-burning, will increase, ultimate victor being the most economical type. A monumental investment in new locomotives has siphoned off capital which might have been used for new freight cars but a balance in spending is being reached.

More Boats—Pressure from hungry blast furnaces caught the Great Lakes ore fleet with its anchor dragging. With the exception of Inland Steel's new *Wilfred Sykes* whose speed and capacity make it the equivalent of two older boats, no new ore freighters were built between 1945 and 1950. Fleet size in fact was reduced in that period, but by late last year contracts had been let for ten new ore and stone boats. These will not come into service until 1952. While greater use of foreign ores is certain, taconite beneficiation will keep the lakes fleet fully occupied for years to come. Other inland waterways are carrying peak loads and further additions to the barge fleet are inevitable.

The shipbuilding industry does not figure prominently in the military plans for the near future. The mothballed fleet provides a reserve which can be activated much faster than new ships can be built. Refitting of these ships will give shipyards the bulk of their work for several years. A new type 20-knot, 12,500-ton, 525-foot dry cargo ship is under consideration. It could outrun most fast submarines known. How many of such vessels might be built hasn't been decided. First will come a contract for a pilot ship which could lead to modifications.

Up in the Air—Military aircraft procurement will gain increasing prominence (there's about $4 billion laid on the line now). Research work on new manufacturing methods and materials will pay off in growing measure over the next several years.

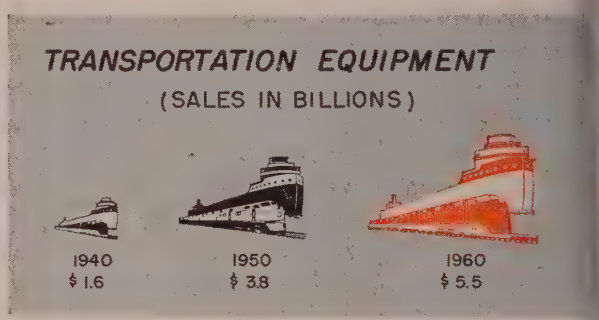
A $200 million program, involving 25 hydraulic presses, has been activated by the Air Force. Extrusion and forging presses hold promise of important materials and cost savings. This program will not be completed until 1952. It will revolutionize manufacturing methods of certain aircraft components.

More Horsepower in the Air—Large orders have come through for almost every type of military aircraft. Build-up of air power is vital and once on a semi-war footing the industry will remain at that level indefinitely. Planners, though, will be alert to the dangers of producing too large quantities of obsolete types and will try for flexibility in manufacturing plant layouts to keep output abreast of changing needs and conditions. After an initial burst, quantity will be sacrificed to this end. Long-range thinking is necessary even for production from already existing plants. Ford's aircraft engine program at the former Dodge-Chicago plant, for example, will require about 18 months for the tool-up, with the 28-cylinder engines to be used in eight types of bombers and cargo-transport craft.

Guided missiles will reach adult stature in several years, but will complement not supplant more conventional types of aircraft. Turbine power may in time replace reciprocating engines in propeller-driven planes, while jet and rocket propulsion will reach a high state of development. Mobility of military manpower offsets relative smallness in number, and recognition of the advantages of airborne equipment and personnel makes far strides in this direction a certainty. Fairchild's new detachable-fuselage plane is a good example, as are some of the newer high capacity long-range transport planes.

If two plus two equals four, let's say so. Thus, stepped-up production potential plus expanded markets must equal improved sales and profits. But it will need bold, aggressive action, confidence and faith in the ultimate goal.

So, we see the prescriptions to be blended if industry is to realize protentials of the fifties—*increased productivity* and *increased markets* to consume the added production. Contemplated capital expenditures for the next five years indicate *improved productivity* will be possible. A surprisingly well sustained increase in the birth rate indicates that *increased markets* will develop in the next decade to justify more production.



A thorough overhaul of present tax depreciation policies of the government is necessary if capital expansions are to continue normally. Capital expenditures are high now because of abnormal economic conditions and in spite of the obsolete federal tax policies.

Ten onrushing years hold tremendous promise of advancement—and warnings of retrogression. American industry had a breath-taking expansion in the nineteenth century during a period highly charged with political change and thunders of war. American industry, halfway through the twentieth century, must learn to swim with the tide of changing political and economic conditions and take more active part and voice in determining them. One hundred years ago industry reaped the benefits of an America expanding geographically. Today, through the United Nations and a free Western Hemisphere, it has a chance of reaping the benefits of an expanding world. Will history repeat?

GROWTH *is a fine thing...* BUT NOT FOR GAGES

DIMENSIONAL STABILITY CONTROLLED

For many years Sheffield has cooperated with the best-known institute of technology in this country in an independent pioneering and development program. The purpose was to discover, if possible, some way to prevent steel in fixed-size gages from growing as it aged. This project has produced so much of value that its findings are now being utilized by our Armed Forces.

With the remarkable progress attained, it has been possible to work out dimensional stabilization processes for Sheffield Nitrigages that have brought Sheffield gage users new plus values in more accurate performance over a longer period of time.

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"Dimensional Stability Controlled" is only one of the many plus values you get in Sheffield Nitrigages. Other advantages are less initial wear, greater resistance to abrasion, less danger of chipping and longer overall service life.

You'll find "It's Wise and Thrifty to Specify Sheffield" fixed and adjustable limit gages from Catalog No. 4849. *Write for this catalog if you don't have one.*

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GAGES • MEASURING INSTRUMENTS • MACHINE TOOLS
CONTRACT SERVICES • THREADING TOOLS

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Have business in Washington? Save yourself time, unnecessary corridor walking, fruitless telephone calls and nonproductive letter writing by first finding the right man to contact. Here is a directory that will help

METALWORKING executives will be turning increasingly to Washington in the coming months to seek answers on price and wage controls, plant expansion, fast amortization, equipment procurement, materials supply, loans, contracting and subcontracting and many other problems.

Do you know your way around Washington these days? If so you are in a select minority. Even the large corporations with ample Washington staffs have trouble keeping abreast of the shifting and expanding defense organizations. You can waste a lot of time ringing the wrong doorbells.

STEEL herewith presents a directory, up-to-the-minute as of Dec. 20.

Instead of listing the brass hats, who will be unavailable to you much of the time, it names those men—with addresses and telephone numbers, whose duty it is to disseminate information and to help you get the answers you need. These men can answer many questions themselves. At other times they can steer you to the right men and even arrange interviews.

Changes in the defense organizations will be numerous. But the men listed in this directory likely will continue to function as indicated. As changes become effective, they will be reported by STEEL each week.

Office of Defense Mobilization

Executive Office Building. Phone EXecutive 3300

Information Officer, Scott Hershey, Room 88, Ext. 3353

Commerce Department
National Production Authority

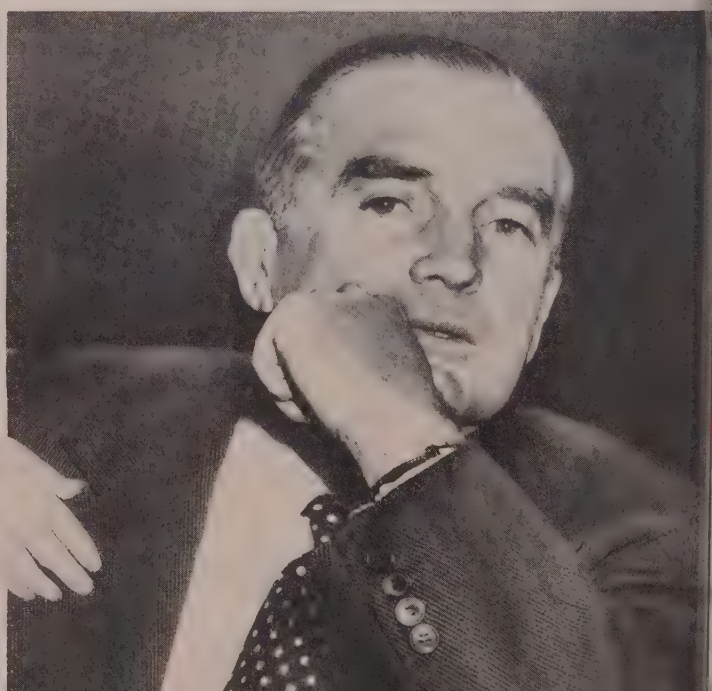
Commerce Building. Phone STerling 9200

Acting Director of Public Information, W. Howard Chase, Room 5111, Ext. 4464

Deputy Director, Edward K. Moss, Room 5111, Ext. 4466

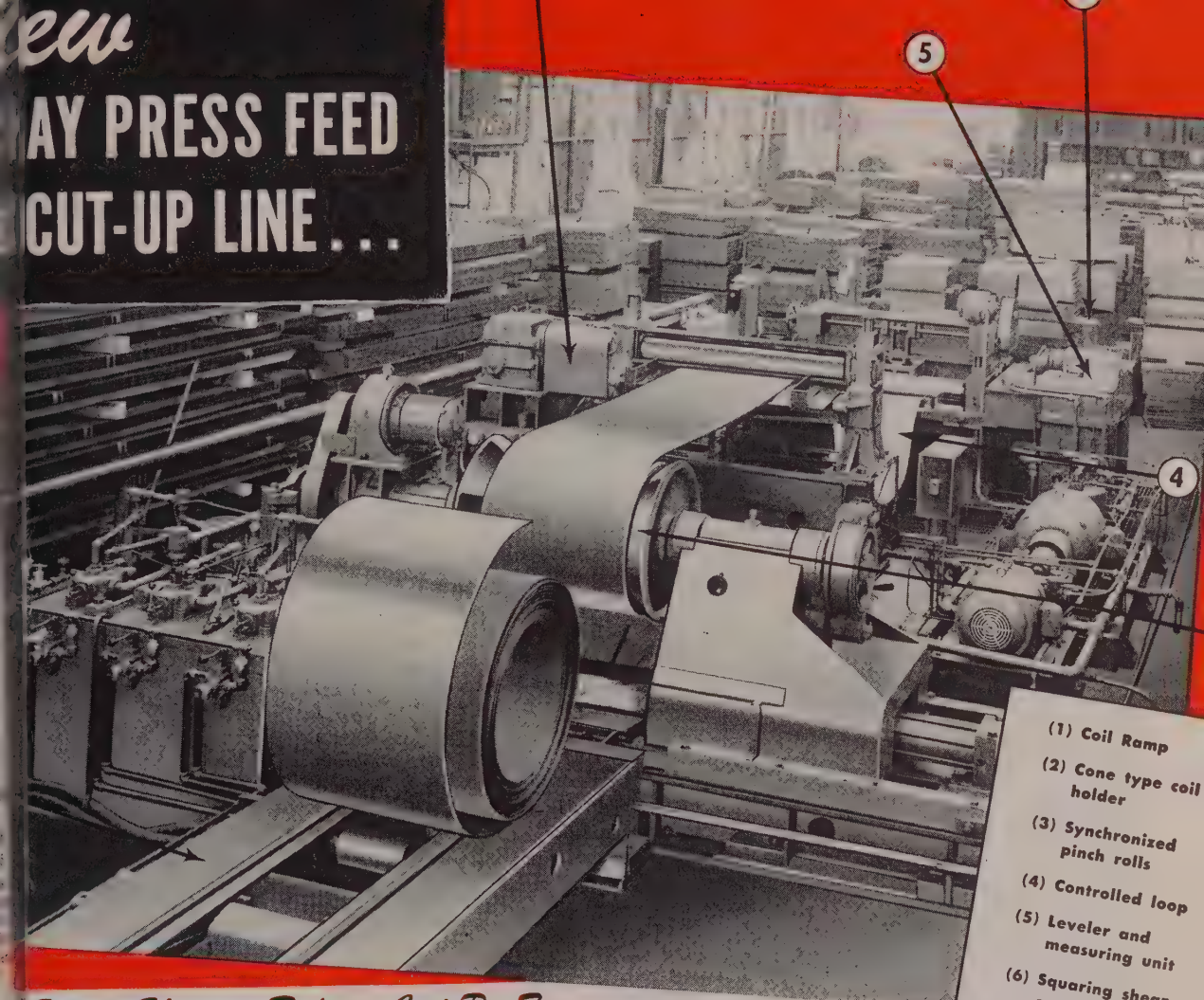
Assistant Director, Albert J. Lubin, Room 5004, Ext. 4445

To get on mailing list to receive copies of press releases and regulatory material as issued by NPA, as well as those already issued, write or phone United States Department of Commerce, Division of Printing Services, attention E. E. Vivian, Room 6225 Commerce Bldg., Washington 25. Phone STerling 9200, Exts. 532 and 568



Gen. William H. Harrison, left, directs the National Production Authority, Department of Commerce. Stuart Symington, below, is chairman of the National Security Resources Board

ew
AY PRESS FEED CUT-UP LINE . . .



Speeds Shearing, Reduces Cost Per Ton

BRIGGS MANUFACTURING COMPANY

THE Briggs Manufacturing Company, one of the leading producers of automobile bodies and plumbing fixtures, has recently installed a 48″ wide McKay press feed line to speed coil shearing at its new Youngstown, Ohio, plant.

On one production run, Briggs sheared 215 tons of 36″ wide, 48″ long, 14 gage sheets from coil, in 16 hours operation. On another occasion 17,000 cuts were made on a two shift basis. Although these production figures do not represent the absolute capacity of this line, they do indicate the dependability and ruggedness of McKay equipment.

The installation illustrated above utilizes hydraulic drives and hydraulic control equipment. Similar lines using electrical drives and electrical control are available.

All equipment illustrated above is applicable to a press feed line merely by substituting a press in place of a shear.

Consult McKay engineers if you have a press or shear feeding problem.

MORE MACHINE

E McKAY MACHINE COMPANY

eers and Manufacturers of Sheet, Tin, and Strip Mill Equipment

YOUNGSTOWN, OHIO

McKAY

FOR YOUR MONEY

NPA Industry Operations Divisions

Phone: STerling 9200

Building Materials—John L. Haynes, 801 E St. N. W., Ext. 2334
Chemicals—Joseph S. Bates, 2358 Temporary T Bldg., Ext. 4637
Construction Materials—James W. Follin, 801 E St. N. W., Ext. 3907
Containers & Packaging—Charles A. Lewis, 2242 Temporary T Bldg., Ext. 2166
Copper—Frank H. Hayes, 3077 Commerce Bldg., Ext. 3918
Electronics & Communications Equipment Products—Donald S. Parris, 2250 Temporary T Bldg., Ext. 2361.
Forest Products—Harold E. Holman, 2007 Temporary T Bldg., Ext. 2123
General Products—Thomas W. Delahanty, 2259 Temporary T Bldg., Ext. 2132
Industrial Economics—Bradford M. Fullerton, 3818 Commerce Bldg., Ext. 3537
Inter-Agency—Lester M. Carson, 1413 Temporary T Bldg., Ext. 3104
Iron & Steel—David B. Carson, 3830A Commerce Bldg, Ext. 4456; F. T. McCue, assistant to director, 3323 Commerce Bldg., Ext. 3962
Light Metals—Nigel H. Ball, 3061 Commerce Bldg., Ext. 4630
Machinery—William L. Beck, 2134 Temporary T Bldg., Ext. 2629
Motion Picture-Photographic Products—Nathan D. Golden, 3826 Commerce Bldg., Ext. 3717
Rubber—Earl W. Glen, 1305 Temporary T Bldg., Ext. 3135

NEA

Charles E. Wilson, former president of General Electric Co. and vice chairman of the War Production Board in World War II, is top man in the economic mobilization effort as director of the Office of Defense Mobilization

Textile & Leather—Julius G. Schnitzer, 2208 Temporary T Bldg., Ext. 3538
Tin, Lead & Zinc—Whitman W. Hopton, 3077 Commerce Bldg., Ext. 3897
Transportation Equipment—Robert L. Glenn, 2011 Temporary T Bldg., Ext. 2955

NPA Office of Small Business

Phone: STerling 9200

Special Assistant to NPA Administrator, for small business, E. H. Lane, 5104 Commerce Bldg., Ext. 4680
Acting Director, J. L. Kelly, 3844 Commerce Bldg., Ext. 2670
Assistant to Director, C. F. Hughitt, 1410 Temporary T Bldg., Ext. 2315
Procurement Assistance Division, chief, E. W. Reisner, 1450 Temporary T Bldg., Ext. 3011
Special Assistance Section, chief, Phillip Bennett, 1427 Temporary T Bldg., Ext. 2668
Management Assistance Division, chief, W. L. White, 1440 Temporary T Bldg., Ext. 2383
Information Specialist, George Roller, 1048 Temporary T Bldg., Ext. 2227

NPA Iron & Steel Division Sections

3814A Commerce Bldg. Phone: STerling 9200, Ext. 2951

Stainless Steel—C. B. Boyne. Pig Iron—John A. Claussen. Alloy & Cold Drawn Bars—L. E. Creighton. Rails & Accessories—John J. Davis Jr. Program—Charles Halcomb. Pipe & Tubing—A. P. Happer. Priorities & Statistical Control—Kenneth H. Hunter. Plant Expansion—H. L. Leyda. Tin Plate—Arthur M. Long. Structural Shapes—R. A. Marble. Wire—Norman F. Melville. Plates—W. E. Mullestein, William E. Bossert. Sheet & Strip—W. B. Quail. Bars & Semi-finished—J. W. Robinson. Warehouse—Russell Link, A. Y. Sawyer. Forgings—H. F. Weaver, J. E. Sweeney. Iron & Steel Castings—A. J. McDonald. Iron & Steel Scrap—Marvin Plan. Refractories—Mrs. Marguerite Sauers. Ferroalloys—James H. Critchett. Metallurgical & Technical—Col. Charles McKnight, V. W. Graze

National Security Resources Board

Executive Office Bldg. Phone: STerling 4700

Special Consultant to Administrator, James R. Aswell, Room 204, Ext. 3242
Director of Information, Scott Hershey, Room 88, Ext. 3353
Assistant Director of Information, Stanley Baitz, Room 88, Ext. 3353
Director Office of Business Expansion (loans and certificates of necessity), Byron D. Woodside, Room 16, Ext. 3258

Defense Department

The Pentagon. Phone: LIberty 5-6700

Industrial Services Branch, Public Relations Division, Office of Public Information, chief, Lt. Col. George W. White; Assistant Chief, Jay Cassino, Exts. 75881 and 75310
Public Relations Advisor to Munitions Board, Floyd B. Brinkley, Room 3E827, Ext. 75361
Central Military Procurement Information Office, director Col. Bernice C. Philipps, Room 3D760, Ext. 75321

Economic Stabilization Agency

Temporary Building E. Phone: STerling 4200

Director of Public Information, J. L. Miller, Room H367, Ext. 3243

Defense Transport Administration

Interstate Commerce Commission Building. Phone: REpublic 7500
General Counsel, Frank Silver, Room 5412, Ext. 5274

Office of Defense Manpower

Labor Department Bldg. Phone: EXecutive 2420

Director of Information, Herbert Little, Room 3218, Ext. 24
Deputy director, Office of Defense Manpower, Leo Wertz, Room 3221, Ext. 215

Maritime Administration

Commerce Bldg. Phone: EXecutive 3340

Director of Information, Stephen C. Manning Jr., Room 4857, Ext. 60

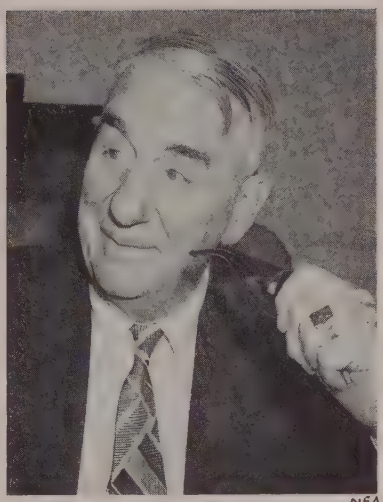
National Advisory Committee for Aeronautics

1724 F Street. Phone: LIberty 5-6700

Information Specialist, Walter T. Bonney, Room 201, Ext. 63229

n Valentine is the Economic Stabilization Agency chief

Michael V. DiSalle is the nation's price controller



NEA

Cyrus S. Ching is wage stabilizer in the controls picture

earch Information Division, Eugene Miller, chief, Room 02, Ext. 63229

Atomic Energy Commission

1901 Constitution Ave. N. W. Phone: STerling 8000

ector of Information, Morse Salisbury, Room 204, Ext. 696

United States Coast Guard

1300 E St. N. W. Phone: EXecutive 6400

lic Information Division, Capt. Samuel F. Gray, chief. ssistant Chief, Lt. Cdr. Wm. D. Straunch Jr., Room 1008, xt. 2993 (These men are also informed on activities of Merchant Marine Council and Ship Structure Committee.)

Reconstruction Finance Corporation

811 Vermont Ave. N. W. Phone: EXecutive 3111

ector of Information, A. B. Merritt, Room 1123, Ext. 90

Interior Department

Interior Bldg. Phone: REpublic 1820

ector of Information, William J. Dougherty, Room 7214, xt. 3171

Defense Minerals Administrations

Interior Bldg. Phone: REpublic 1820

ector of Information, Bureau of Mines, Allan Sherman, Room 2611, Ext. 3337

Petroleum Administration for Defense

Interior Bldg., Phone: REpublic 1820

puty Administrator, Bruce K. Brown, Room 6654, Ext. 3831

Defense Power Administration

Interior Bldg. Phone: REpublic 1820

ector of Information, George Holmes, Room 4552, Ext. 3222

Defense Solid Fuels Administration

Interior Bldg. Phone: REpublic 1820

ector of Information, Bureau of Mines, Allan Sherman, Room 2611, Ext. 3337

General Services Administration

Eighteenth and F Streets N. W. Phone: EXecutive 4900

ector of Public Information & Reports, Joseph S. Cohen, Room 6113, Ext. 4511

puty Director of Public Information, Herbert C. Plummer, Room 6113, Ext. 4511

Department of Agriculture

Production and Marketing Administration

South Agricultural Bldg. Phone: REpublic 4142

Director of Information, James B. Hasselman, Room 2621, Ext. 5237

Office of Requirements and Allocations

South Agriculture Bldg., Phone: REpublic 4142

Director of Information, Grant Lyons, Room 2613, Ext. 5355

Office of Materials and Facilities

South Agriculture Bldg. Phone: REpublic 4142

Director of Information, Grant Lyons, Room 2613, Ext. 5355

Board of Governors of Fed. Res. System

Federal Reserve Bldg. Phone: REpublic 1100

Director of Information, Elliott Thurston, Room 2045, Ext. 206

Housing and Home Financing Agency

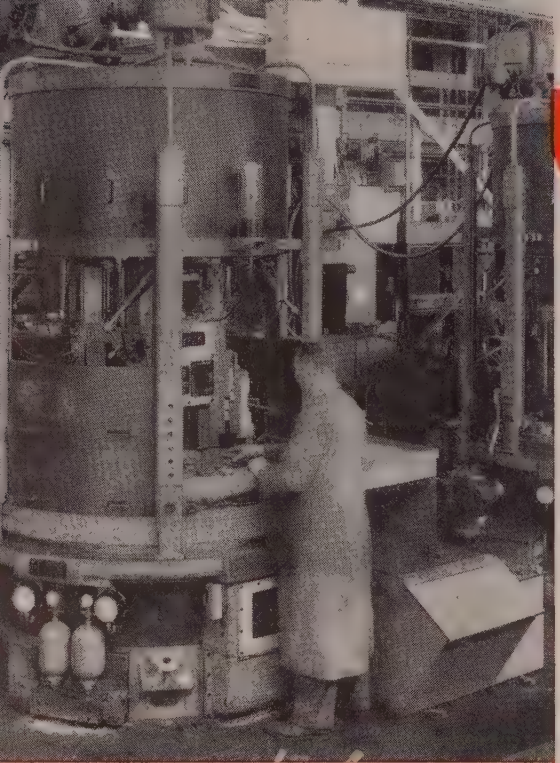
Normandy Bldg., 1626 K St. N. W. Phone: EXecutive 4160

Director of Information, Jack H. Bryan, Room 610, Ext. 2486

Jess Larson heads General Services Administration

NEA

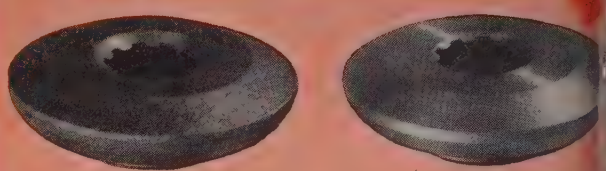
Dr. James Boyd is Defense Minerals Administrator



"K" 6 STATION 12-SPINDLE MULT-AU-MATIC

83%

INCREASE In Production



Type "K" Mult-Au-Matic 550

Type "D" Mult-Au-Matic 300 Pcs

A QUOTATION FROM THE FIELD:

"We were especially impressed on this job with the ease in which the operator was able to load unload this machine at the rate of 550 pcs. per hour compared with the operator on the 8 spin double index Type "D" Mult-Au-Matic on the same operation, who was busy trying to produce per hour."

Twin spindles and twin tooling at each station, and each station with succeeding operations, provides a progressive, high efficient Prod tion Method on Differential Side Gears.

Ask for information on Type "K" Mult-Au-Matic application to your w

STATION 2 STATION 3 STATION 4 STATION 5 STATI

Refinement in design, higher spindle speeds, faster index and in many cases an improved method for 1st 2nd chucking on the same machine are only some of the factors that place the Type "K" Mult-AU-Matic in class by itself for Productive Economies.

THE BULLARD COMPANY BRIDGEPORT 2, CONNECTIC

H. C. TUTTLE *Detroit Editor, STEEL*

Mirrors of Motordom

Auto industry, with greatest year of civilian production under its belt, looks forward to helping country rearm in months ahead. Passenger car output in 1951 may be only half of last year's astounding total

S THE automotive industry pauses for a breather, rtly of relief and partly of exhaustion, it is certain only two things: Never a year like the one just ssed, and never more uncertainty than for the ar ahead.

Achievements of 1950 shattered all expectations. arewd prognosticators missed their production fore-sts by two million or more. Even when the cold, rd facts are put in the record books they will meet ith more headshaking, more murmurs of "I know happened, but it couldn't have."

So, for the record and for the edification of dis-lievers, here in round numbers is what the industry complished in 1950:

Built in the U. S. and Canada was a total of 8,295,-)0 cars, trucks and busses (December estimated). his was 27 per cent more than in 1949, the previous cord year, and the year which once looked like all-me tops for the industry. Of the total, 6,880,000 ere passenger cars, 1,415,000 trucks and busses. his staggering pile of new vehicles is about 62 per nt more than were built in 1941.

Wholesale value was almost $10.5 billion. Passenger rs represented $8.8 billion, trucks and busses $1.63 llion. The total is 27 per cent beyond the 1949 gure. Wholesale value of replacement parts sold st year was off 5 per cent from 1949, but at $1.8 llion was 151 per cent higher than 1941.

Jobs for One of Every Five—New vehicle and parts les, however, account for only part of the total utomotive impact on the nation's economy. It is stimated 9 million people are employed in indus-ies relating to highway transportation. This in-udes those in manufacturing, petroleum refining, les and service, road building, truck driving and the ke. The industry with its many facets has come to epresent a $25 billion-a-year enterprise, accounting r more than 20 per cent of all retail trade and ncompassing over 435,000 establishments.

There are now on the road 48,484,000 vehicles. ith car and truck registrations establishing new ecords last year, the passenger car total has swelled 39,710,000 while trucks and busses number 8,714,-)0. These figures are 35 per cent above car registra-ons in 1941 and 76 per cent greater for trucks.

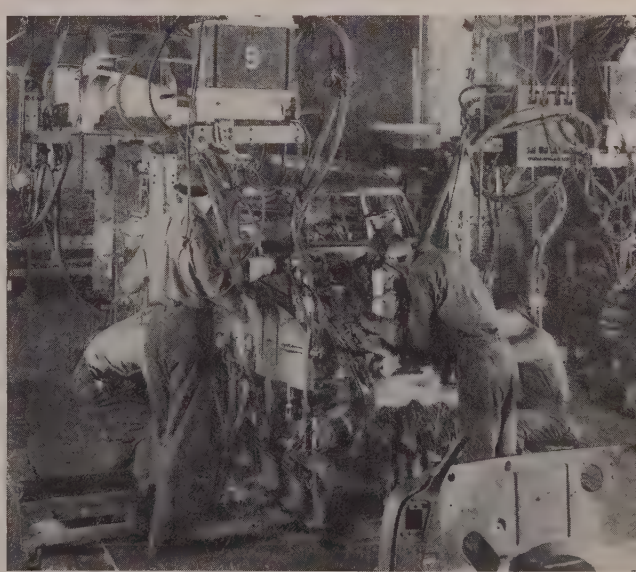
And these vehicles were on the move much of the me, a fact well known to city drivers, most of whom spect that all are waiting in the same lane for a affic light to change. Actually, despite unprecedented ongestion, the nation's drivers managed to roll up an stimated 450 billion miles to top the 1949 record by per cent.

Aside from the far-reaching industry being the eans of livelihood for nine million, its products are a most significant source of income for governments. Special taxes on vehicles contributed an estimated $4320 million to collectors last year. That was 12 per cent more than in 1949 and nearly twice as much as in 1941. Of the total, $1725 million came from state gasoline taxes,$1440 million from federal excise levies, $905 million from state registration fees, and $252 million from local taxes and toll fees.

The highest peacetime level of employment was attained by the car markers. They listed 784,300 production employees. This compares with 643,000 in 1949 and 570,000 in 1941. Number of salaried workers rose to 129,300, as against 125,000 in 1949 and 84,000 in 1941. To these people $2685 million was paid, also a peak, and 129 per cent more than in 1941.

Little Rejuvenation Noted—It would be logical to expect that vehicle turn-out during the post-World War II years of such hopped-up proportions would have brought the average age of cars and trucks in use down substantially. Not so. More than 40 per cent of all cars and 33 per cent of the trucks are vintage 1940 or earlier. In 1941 only 17 per cent of the cars and 18 per cent of the trucks were ten or more years old. People use their cars more, keep them longer and place greater dependence on them.

Surveys indicate only 16 per cent of all car trips have social or recreational connotation. About one-



Clamped rigidly in the framing jig, body panels and structural components become a Studebaker skeleton under the touch of portable electric welding guns. In a matter of minutes the body-in-white is up and away on overhead conveyor

third of the times the average motorist gets his car out of the garage he goes to the store, takes his kids to school, sees his dentist twice a year, etc. But 52 out of every 100 trips he makes are for the purpose of earning a living, going to work, calling on prospects.

In this traditionally American atmosphere of dependence on his car and almost ridiculous sentimental attachment to it, the individual motorist is the most important guy in the world to the car makers. They live by knowing what he wants as long as two years before he himself knows. Right now the 1953 models are taking shape in stylists' studios and on drawing boards.

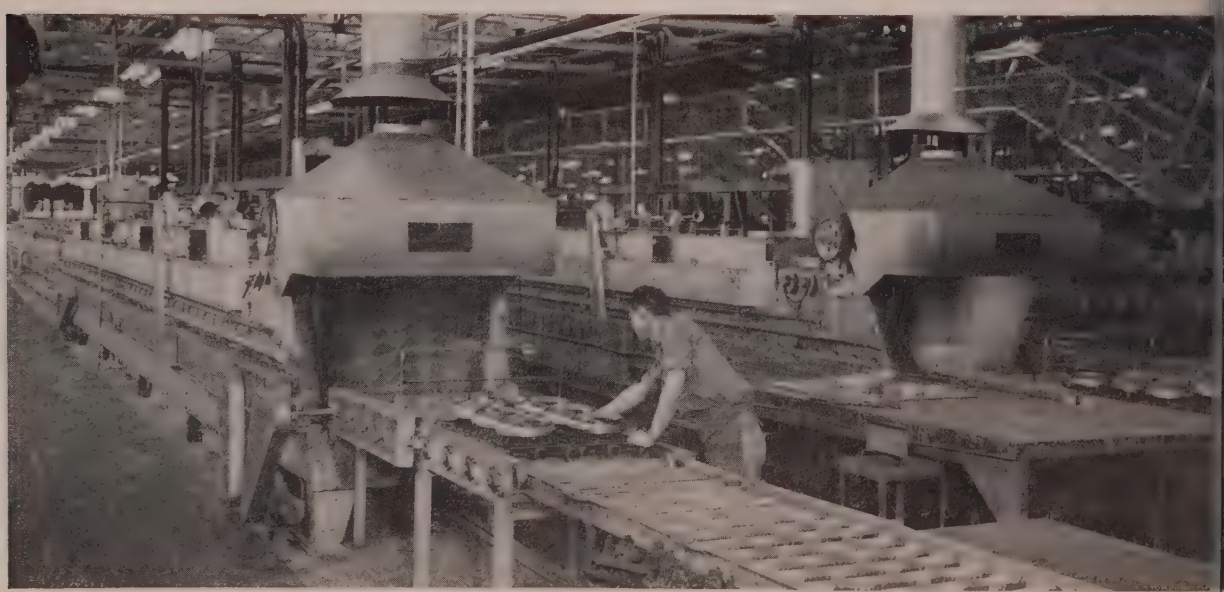
What Good Production Capacity?—The industry is geared to produce at a breathtaking rate. Every 1.2 seconds six days a week, eight hours a day, one of its new vehicles was sold last year. The perfectly meshed gears slip every time a single element, whether a material, man or machine, turns up missing. The gears are certain to go further out of mesh from now on. It is problematical whether much more than 50 per cent of the car production of last year can be realized this year. As the industry sizes it up, all the headaches of the postwar period from the steel conversion deals to the nickel shortage, will be compounded. The industry will be contending with regulations, some hastily composed, difficult of interpretation and possibly outright unworkable. It will also be trying to put its might behind a mobilization program which at the outset lacks form or mass.

There is no shirking of responsibility in the program. Auto plants are asking urgently for a share of it. Unemployment in Detroit, it is feared will reach 100,000, almost 10 per cent, by Mar. 1. There are as yet almost no military orders to take up the slack in equipment and manpower which limitation orders on materials are generating. Government orders to the industry and its parts and accessories suppliers through December were piddling. It is estimated that less than 3 per cent of productive capacity will be occupied with defense work when tooling for present orders is completed.

Companies with orders of any size are in the minority. Cadillac, with a tank order of $110 million, is a bright spot on the Cleveland scene, as is Ford's B-36 engine program at Chicago. Both, however, are a long way from the production stage, and are so far from Detroit as to be almost forgotten when the subject of defense orders comes up in conversation there. Packard is doing developmental work on aircraft and marine engines, and has contract for building small diesels for the Navy. Several truck makers are occasionally using olive-drab in their paint sprayers, but on the whole there is little in sight to fill production lines when the metals curtailments on civilian consumption begin to take hold.

Major Engine Changes Coming—The big noise on the production front is in the field of power plants, V-8 overhead valve and high-compression types for the most part. Studebaker introduced a V-8 overhead-valve engine on its Commander models, with compression ratio of 7:1 and designed to be adaptable to increases as higher octane fuels become available. Hudson installed a 6-cylinder 145-hp engine with a 7.2:1 compression ratio in its new Hornet series. The new Willys-Overland F-head 4-cylinder engine with compression ratio of 7.4:1 is also used in Kaiser-Frazer's "Henry J." Ford is working on a high-compression overhead valve V-8 and six. Buick and Chrysler have V-8 engine programs in advanced stages, the latter scheduled for unveiling in February.

Public approval of automatic transmissions caught the industry a little off balance. As new models were introduced with clutchless drives — most recently



Primary pump assemblies for the Chevrolet automatic transmission, precision-made steel stampings dipped in a liquid carrying copper powder, are placed on trays and moved into a 184-foot brazing furnace

tard, Ford, Mercury and Studebaker—and four r makers began equipping their cars with Hydra-c, some dealers were faced with the unpleasant e of talking down the units because of their com-itive scarcity. It is estimated, however, that than 50 per cent of all 1950 models carried con-ional synchromesh transmissions, and it is ex-ed that in a few years, five at the outside, auto-ics will be standard on passenger cars. Improve-ts in operating, servicing and manufacturing are ertainty. Manufacture of the units is complex requires precision workmanship of a kind not ally associated with production-line industries.

he craftsmanship angle originally inspired Packard y out its Ultramatic final assembly line with each having the job of assembling one complete unit. line now, however, has a more conventional aspect each man installing a component subassembly the unit is completed.

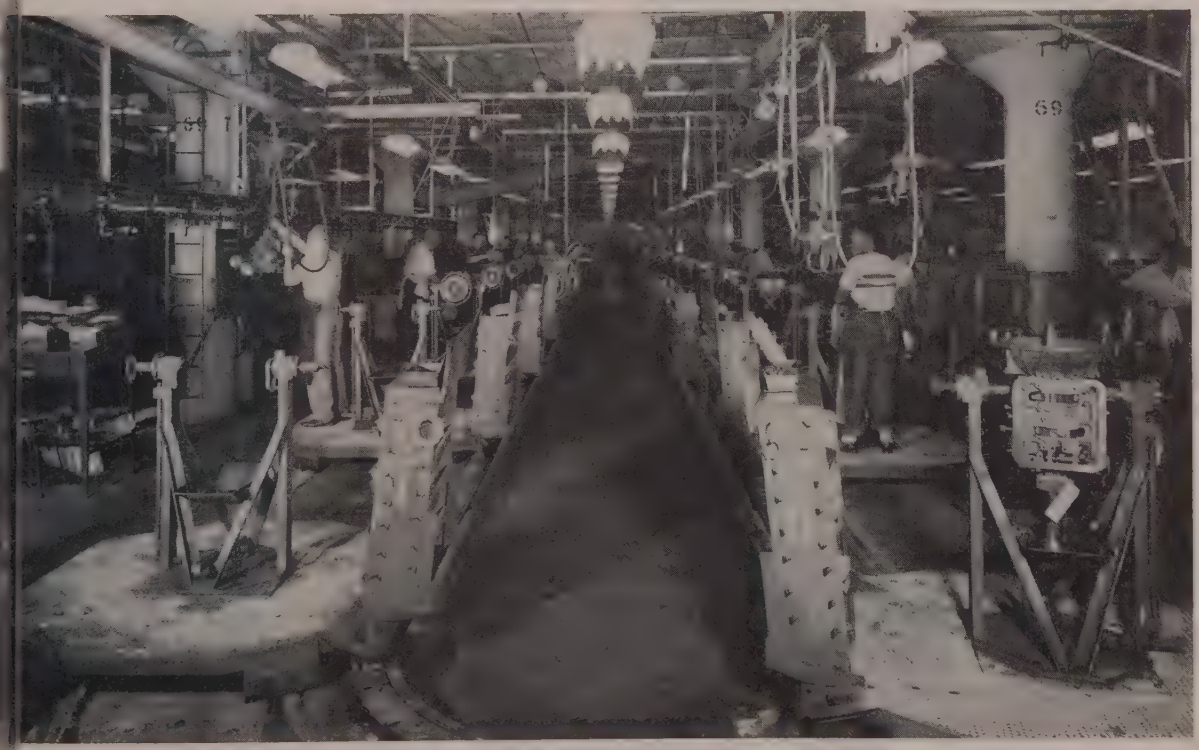
he industry also misjudged the extent to which public wanted another car feature—the "hard-top ertible." Studebaker with its well-glassed body gn perhaps never received the share of credit leserved for introducing something brand new ral years ago. Three divisions of General Motors the ball rolling when they put out a convertible with welded-on steel top. Reaction was im-iate and without parallel. Demand far outstripped city and forced many other makers to rush ugh similar body styles. The trend has not yet its course. Thus scheduled for spring introduc-is a Ford "hard-top."

Other changes in body design of 1951 models, with a few exceptions, defy the untutored eye to catch. Distinguishing characteristics for the most part are in grille modifications, more lavish use of chrome and stainless trim in deluxe models (much less in standard), and heightening of rear fender lines. Packard and Kaiser-Frazer made striking body changes, and a new Oldsmobile-Buick 1951 body design will be significantly different.

Maximum limits in body dimensions apparently have been reached. A shortening-up trend will follow adoption of more compact power plants.

Buyers Say Heavy on the Chrome—The expectation early last year was that public price consciousness would give a boost to sale of standard models. A stripped version of Studebaker's Champion in fact appeared. But two car builders—Nash and Kaiser-Frazer—went further on the way toward encouraging the desire for lower priced cars by bringing out smaller designs, well above the midget class and with most of the conventional appurtenances. Nash gave its first Rambler convertible the full treatment with $300 worth of factory-installed accessories. K-F's Henry J originally was stripped of ornamentation but was dolled up somewhat by introduction time. The public has indicated it wants the plushy jobs and has the money for them, so deluxe-trimmed models of most manufacturers will remain in vogue as long as the materials to build them are obtainable.

The immediate postwar dreams of revolutionary new materials for automobile bodies have been forgotten, but a few are showing up in different places.



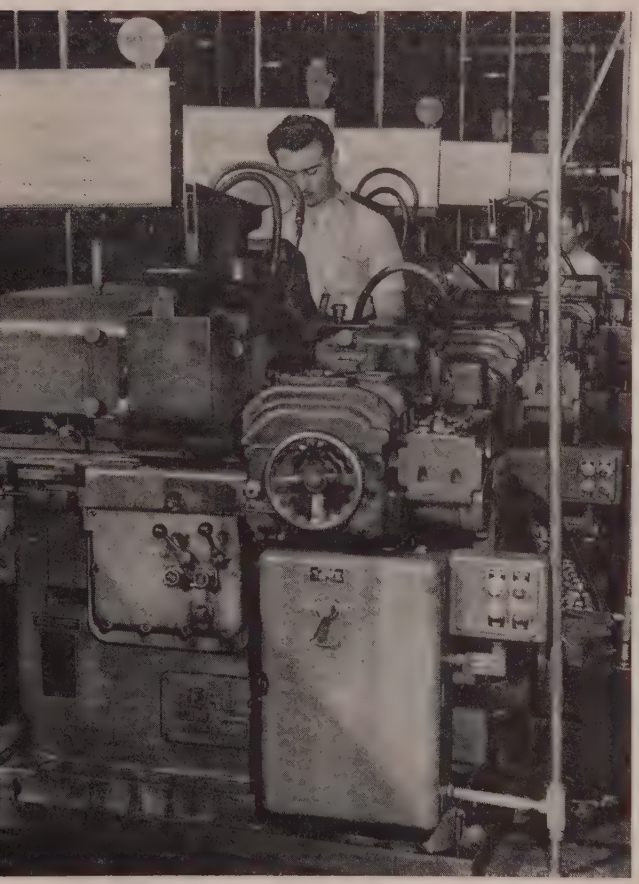
Final assembly line for Packard's automatic transmission, a 146-foot oval line, with 11 subassembly points including final test, first station being at the right. This system replaces a former merry-go-round where one man assembled a complete unit

Plastics, experimented with in trunk lids and the like, are proving useful. An unusual application is in the new Studebaker rear springs, the four leaves of which are separated by polyethylene liners. Kaiser-Frazer is using phenolic casting resin indirectly in its car.

The master models from which the dies for body panels are made are cast in this material. A time saving of 50 per cent over conventional wood model-making is claimed. Not yet a part of the manufacturing scheme, but understood to be a top-priority research project in several automotive foundries is the use of plastic-impregnated sand—principal element in the Croning process. Automatic machinery for mold and core making is being built for one major car producer's use.

The industry now has what it takes to produce more than 10 million vehicles a year. At last year's rate of production, however, supply was on the verge of catching up with demand several times, but the balance was never quite achieved for every make of car.

Scare buying widened the gap and, as the realization sinks in that sharp curtailments in output are inevitable, demand may zoom again. A good bet is that some form of new car rationing will be instituted this year.



Quality control charts mounted on machines in Ford plants reflect dimensional variations of parts being produced. Plywood flags on the charts show either a green ball, signifying "in control" or a red hand meaning "out of control." System has eased inspection, lowered rejects

More Millions for Equipment—Car makers are not completely shelving expansion plans, despite the uncertainty of the times. Ford has set its sights on $1 billion expenditure over the next three years, this added to $600 million spent since 1946 for expansions and improvements. The basic reason for heavy spending is to achieve lower manufacturing costs, not to increase output except in special cases such as automatic transmissions. A steady weeding out of inefficient production facilities is in progress, and for efficient use of some of the new manufacturing techniques new plant layouts are dictated.

One *au courant* subject in manufacturing is statistical quality control. Every inspector knows his job theoretically shouldn't be necessary. It's money in nobody's pocket to throw out or rework parts falling outside dimensional or quality tolerances. Furthermore, it is estimated 15 per cent of all defective parts escape detection.

The answer, obviously, is to set up controls to prevent defective parts from coming out of machines. As an example of the attention being given to the problem, Ford's approach is intensive and far reaching, including major suppliers who have also put in control systems to achieve the desired quality and keep costs low. The chart control system is now in use in more than 90 per cent of Ford's production departments.

To assure continuous production and to encourage co-operation from workers in new manufacturing methods, most of the autobuilders last year signed long term wage contracts, not reopenable on economic issues until 1955. Providing for annual raises based on prospective technological advances and tying wage rates to the cost of living to prevent inflation (or deflation) from spoiling the scheme, the contracts give promise of more harmonious labor-management relations. A more influential voice in management will continue to be sought by labor, and demands can be expected for spread-work schedules or for guaranteed annual wage during the trouble some transition period until a war-peace production balance is established.

Wartime Problems Back Again—Strong indication that the nation will return to practically allout controls make it appear that the war-peace production ratio will weigh heavily on the side of materiel. As the year advances, the average automobile driver conceivably will find it increasingly difficult to replace his old car—and may not be able to at all if he is not in an essential war industry.

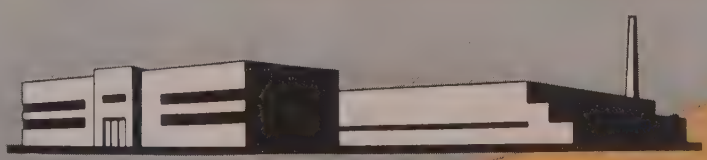
The story on how many cars the auto industry will be permitted to produce will be told between now and Apr. 1 when the National Production Authority decides how available supplies of nonferrous metals and steel products are to be divided among the various claimant agencies.

As evidenced by the last war, the auto industry can keep its plants at capacity after conversion, by producing such non-related items as artillery in addition to the wheeled vehicles needed to keep the armies of the U. S. and its Allies rolling.

Facts and Figures

ON METALWORKING...

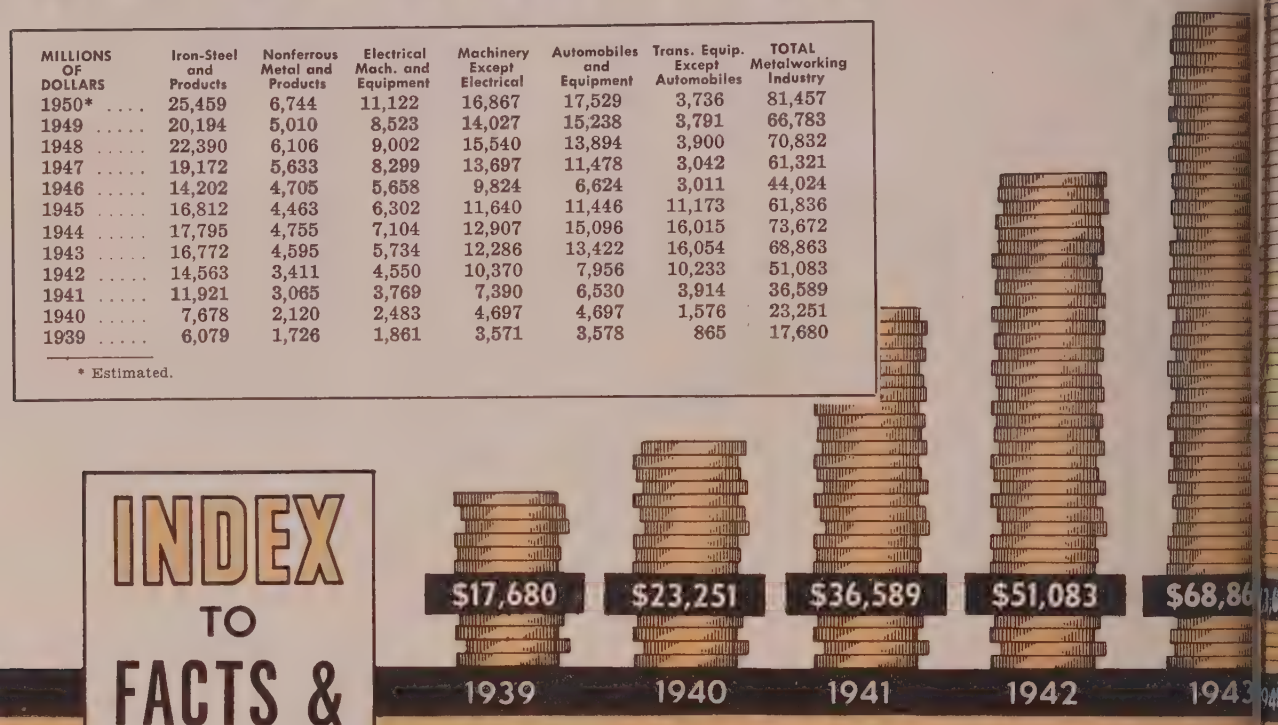
● THIS 32-page special section is your 1951 edition of Facts and Figures on Metalworking. It continues and brings up to date the edition published a year ago. While there have been some refinements in this handy reference section, STEEL has retained in it much of the appearance and layout of the 1950 edition so that tables and charts you have been accustomed to referring to throughout this last year will be found again in their familiar places. The facts and figures were compiled by the editors of STEEL, by trade associations, by government departments and by private research organizations, and are brought together in a compact package for the convenience of the busy metalworking executive. As additional statistics come forth during the year they will be reported in STEEL's Business Trend section appearing every Monday.



METALWORKING ... Americ

MILLIONS OF DOLLARS	Iron-Steel and Products	Nonferrous Metal and Products	Electrical Mach. and Equipment	Machinery Except Electrical	Automobiles and Equipment	Trans. Equip. Except Automobiles	TOTAL Metalworking Industry
1950*	25,459	6,744	11,122	16,867	17,529	3,736	81,457
1949	20,194	5,010	8,523	14,027	15,238	3,791	66,783
1948	22,390	6,106	9,002	15,540	13,894	3,900	70,832
1947	19,172	5,633	8,299	13,697	11,478	3,042	61,321
1946	14,202	4,705	5,658	9,824	6,624	3,011	44,024
1945	16,812	4,463	6,302	11,640	11,446	11,173	61,836
1944	17,795	4,755	7,104	12,907	15,096	16,015	73,672
1943	16,772	4,595	5,734	12,286	13,422	16,054	68,863
1942	14,563	3,411	4,550	10,370	7,956	10,233	51,083
1941	11,921	3,065	3,769	7,390	6,530	3,914	36,589
1940	7,678	2,120	2,483	4,697	4,697	1,576	23,251
1939	6,079	1,726	1,861	3,571	3,578	865	17,680

* Estimated.



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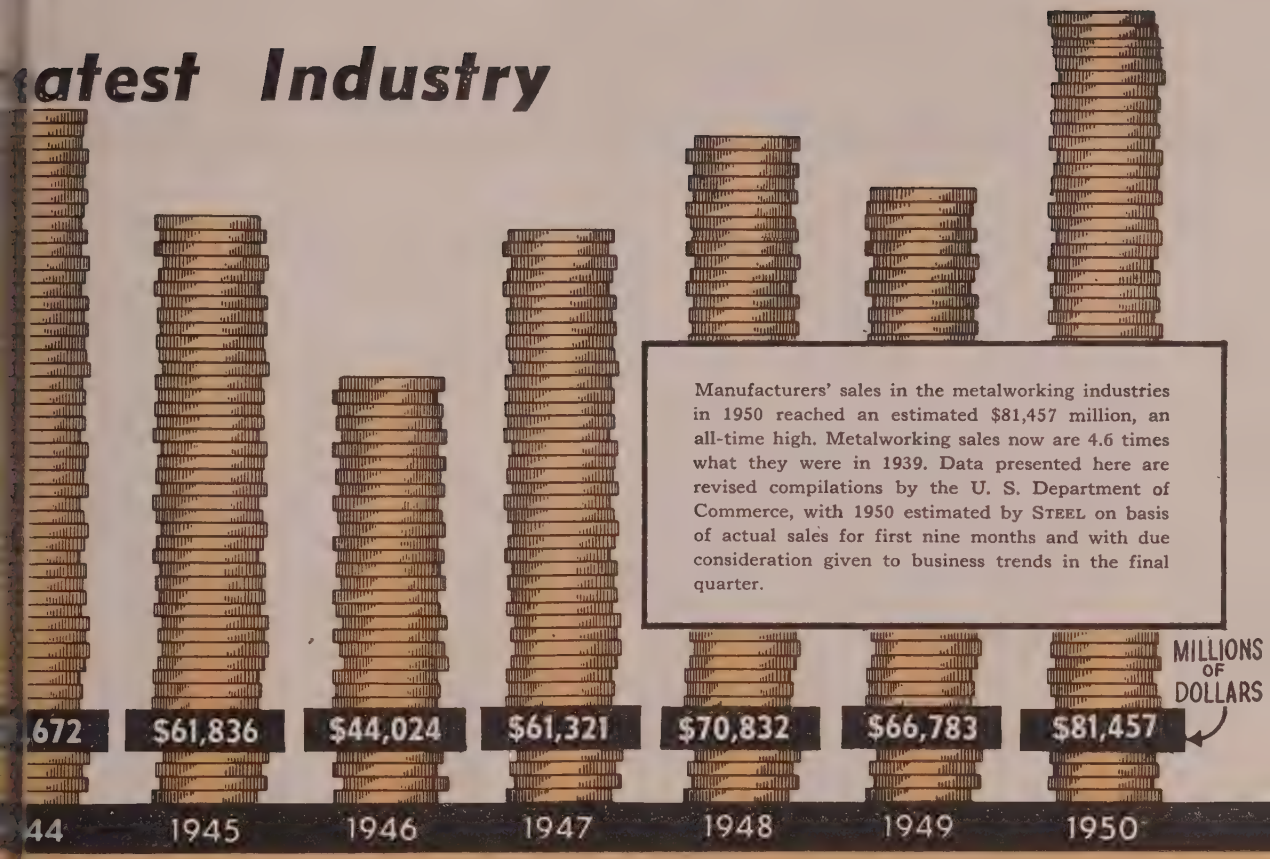
atest Industry
Manufacturers' sales in the metalworking industries in 1950 reached an estimated $81,457 million, an all-time high. Metalworking sales now are 4.6 times what they were in 1939. Data presented here are revised compilations by the U. S. Department of Commerce, with 1950 estimated by STEEL on basis of actual sales for first nine months and with due consideration given to business trends in the final quarter.
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,672
$61,836
$44,024
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World Production

METALWORKING FACTS AND FIGURES

By Countries—Net Tons

STEEL INGOT AND CASTINGS OUTPUT

	1950a	1949	1948	1947	1946	1945	1944	1943
World Total	203,200,000	172,898,006	168,764,990	147,200,111	120,881,060	120,583,828	163,586,576	174,888,688
United States	96,500,000	77,978,176	88,640,470	84,894,071	66,602,724	79,701,648	89,641,600	88,836,512
Canada	3,350,000	3,185,280	3,198,720	2,945,936	2,334,640	2,877,952	3,016,160	3,004,176
Great Britain	18,000,000	17,419,250	16,661,800	14,250,880	14,218,736	13,244,000	13,599,264	14,594,720
France (b)	9,600,000	10,672,000	7,959,600	6,317,766	4,858,000	1,831,200	3,407,600	5,650,400
Saar	2,050,000	1,932,700	1,350,800	780,216	Included in Germany			
Belgium	4,150,000	4,233,900	4,308,700	3,179,270	2,517,200	812,000	685,440	1,841,280
Luxemburg	2,700,000	2,502,500	2,698,300	1,887,726	1,426,096	291,200	1,398,544	2,379,440
Italy	2,500,000	2,260,500	2,337,500	1,874,502	1,270,640	436,800	1,130,752	1,903,328
Spain	900,000	752,600	631,680	596,182	660,800	616,000	700,000	728,000
Sweden	1,600,000	1,505,300	1,382,700	1,312,482	1,324,624	1,316,000	1,316,000	1,344,000
Germany (c)	14,700,000	10,841,600	6,482,300	3,490,034	3,318,448	1,705,984	20,187,888	22,877,008
Austria	1,000,000	918,500	712,800	394,516	206,080	189,504	1,116,416	1,160,992
The Netherlands	450,000	400,000	380,800	.....	.....	.....	.....	.....
Czechoslovakia	3,000,000	2,950,000	2,915,000	2,519,172	1,842,624	1,047,200	2,802,576	2,770,656
Poland	2,750,000	2,500,000	2,150,000	1,740,058	1,344,000	545,552	2,149,056	2,688,120
Hungary	1,000,000	935,000	820,000	662,302	392,000	141,904	573,888	855,680
Rumania	550,000	500,000	373,000	.....	.....	.....	.....	.....
Yugoslavia	550,000	440,000	400,000	.....	.....	.....	.....	.....
Russia (a)	27,000,000	22,000,000	18,150,000	14,300,000	13,440,000	10,080,000	8,960,000	8,960,000
Japan (d)	5,000,000	3,346,000	1,900,000	1,070,042	700,000	1,173,700	8,099,168	10,061,968
India	1,500,000	1,518,700	1,344,000	1,389,732	1,457,120	1,515,136	1,533,168	1,570,464
Australia	1,400,000	1,300,000	1,424,640	1,511,328	1,124,144	1,573,600	1,784,048	1,912,064
So. Africa	800,000	806,000	766,080	658,896	555,184	588,448	533,008	460,880
Brazil	800,000	670,000	531,300	426,900	378,015	226,530	241,235	202,758
Mexico	350,000	380,000	294,800	353,100	276,100	211,200	199,320	194,040
Miscellaneous	1,000,000	950,000	950,000	645,000	633,885	458,270	511,445	891,202

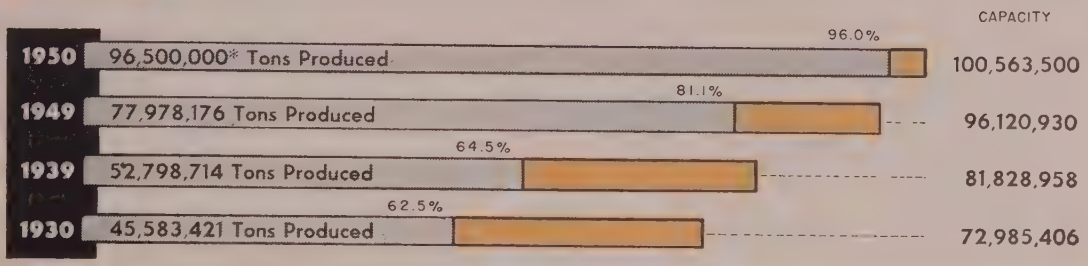
(a) Estimated.
(b) Without Alsace Lorraine until 1945.
(c) All occupied zones of Germany proper since September 1945, but without Saar from 1947.
(d) Including Korea and Manchuria until July 1945.

PIG IRON AND FERROALLOYS OUTPUT

	1950a	1949	1948	1947	1946	1945	1944	1943
World Total	145,139,000	127,697,665	124,250,549	107,664,844	85,225,946	85,219,845	118,256,582	125,768,379
United States	65,704,000	54,916,785	61,911,559	60,117,319	46,514,826	54,919,029	62,866,198	62,769,947
Canada	2,500,000	2,366,560	2,365,440	2,190,048	1,520,736	1,956,080	2,023,952	1,955,408
Great Britain	10,600,000	10,638,320	10,389,570	8,719,200	8,692,544	7,960,288	7,544,880	8,049,328
France (b)	8,550,000	9,179,500	7,214,900	5,384,372	3,857,280	1,303,680	3,188,640	5,423,040
Saar	1,850,000	1,740,200	1,247,400	719,606	Included in Germany			
Belgium	3,900,000	4,119,500	4,337,300	3,107,640	2,392,656	803,040	779,520	1,800,960
Luxemburg	2,750,000	2,609,200	2,886,400	2,003,436	1,504,384	350,560	1,485,568	2,499,504
Italy	750,000	489,500	578,600	425,372	192,864	87,360	336,784	709,744
Spain	740,000	673,200	581,500	554,306	540,960	516,320	604,800	660,800
Sweden	960,000	887,000	858,480	800,052	750,400	862,400	952,000	884,800
Germany (c)	10,900,000	8,130,000	5,350,000	2,640,392	2,707,824	1,237,600	15,835,792	17,602,368
Austria	950,000	927,300	688,200	306,356	63,840	110,208	1,061,312	1,115,520
The Netherlands	500,000	476,300	486,200	.....	.....	.....	.....	.....
Czechoslovakia	2,200,000	2,000,000	1,850,000	1,568,146	1,058,400	635,040	1,724,800	1,850,352
Poland	2,500,000	2,300,000	1,210,000	957,638	800,800	268,800	1,206,800	1,288,336
Hungary	500,000	475,000	445,000	339,416	175,840	48,160	230,720	460,096
Russia (a)	21,000,000	18,500,000	15,400,000	12,500,000	10,080,000	8,400,000	7,840,000	6,720,000
Japan (d)	2,400,000	1,770,000	914,100	409,940	203,840	1,400,000	6,192,592	6,850,816
India	1,750,000	1,733,800	1,639,700	1,553,269	1,584,912	1,554,000	1,616,384	1,970,752
Australia	1,350,000	1,100,000	1,383,900	1,280,384	978,656	1,298,640	1,462,048	1,611,904
So. Africa	760,000	779,500	705,100	707,952	597,184	612,640	519,792	536,704
Brazil	750,000	551,000	607,200	426,827	378,015	226,530	241,235	202,758
Miscellaneous	1,275,000	1,335,000	1,200,000	953,173	629,985	669,470	542,765	805,242

Production-Capacity

METALWORKING FACTS AND FIGURES



ANNUAL STEEL CAPACITY AND PRODUCTION BY PROCESSES

	Open-hearth		Bessemer		Crucible		Electric		TOTAL		Per Cent
	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity
1950	87,858,990	.....	5,621,000	.....	[illegible]	‡	7,083,490	.....	100,563,500	96,500,000*	96.0*
1949	84,817,040	70,248,803	5,191,000	3,946,656	[illegible]	‡	6,112,870	3,782,717	96,120,930	77,978,176	81.1
1948	83,610,690	79,340,157	5,226,000	4,243,172	[illegible]	‡	5,396,750	5,057,141	94,233,460	88,640,470	94.1
1947	81,010,990	76,873,793	5,154,000	4,232,543	20	‡	5,076,240	3,787,735	91,241,250	84,894,071	93.0
1946	81,236,250	60,711,963	5,154,000	3,327,737	[illegible]	‡	5,500,290	2,563,024	91,890,560	66,602,724	72.5
1945	84,171,590	71,939,602	5,874,000	4,305,318	3,800	24	5,455,890	3,456,704	95,505,280	79,701,648	83.5
1944	82,223,610	80,363,953	6,074,000	5,039,923	3,800	25	5,350,880	4,237,699	93,652,290	89,641,600	95.5
1943	79,180,880	78,621,804	6,553,000	5,625,492	3,800	146	4,554,980	4,589,070	90,292,660	88,836,512	98.1
1942	78,107,260	76,501,957	6,721,400	5,553,424	3,800	2,010	3,737,510	3,974,540	88,569,970	86,031,931	96.8
1941	74,565,510	74,389,619	6,996,520	5,578,071	3,942	2,313	2,586,320	2,869,256	84,152,292	82,839,259	97.3
1940	73,721,592	61,573,083	6,009,920	3,708,573	5,354	1,024	1,882,630	1,700,006	81,619,496	66,982,686	82.1
1939	72,959,638	48,409,800	7,138,880	3,358,916	5,354	931	1,725,086	1,029,067	81,828,958	52,798,714	64.5
1938	71,472,370	29,080,016	7,212,800	2,106,340	9,610	7	1,490,858	565,627	80,185,638	31,751,990	39.6
1937	69,725,736	51,824,979	7,084,000	3,863,918	11,850	1,046	1,326,788	947,002	78,148,374	56,636,945	72.5
1936	68,946,829	48,760,463	8,058,400	3,873,472	11,850	914	1,147,221	865,150	78,164,300	53,499,999	68.4
1935	68,544,310	34,401,280	8,842,400	3,175,235	11,850	719	1,053,370	606,471	78,451,930	38,183,705	48.7
1934	68,222,445	26,354,838	8,842,400	2,421,840	18,704	595	1,044,867	404,651	78,128,416	29,181,924	37.4
1933	68,241,286	22,827,473	8,872,668	2,720,246	23,684	763	1,476,765	471,747	78,614,403	26,020,229	33.1
1932	68,176,102	13,336,210	9,072,420	1,715,925	24,725	722	1,507,666	270,044	78,780,913	15,322,901	19.5
1931	66,642,430	25,210,714	9,080,820	3,386,259	30,891	1,733	1,503,662	460,255	77,257,803	29,058,961	37.6

* Estimated by STEEL. ‡ Included with electric steel. American Iron & Steel Institute.

MONTHLY OUTPUT OF STEEL FOR INGOTS AND CASTINGS

	Open-hearth		Bessemer		Electric		Total		Calculated	No.
	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons Weekly	weeks in mo.
1950 ..	.....	...	.....	...	.....	...	96,500,000*	96.0*	1,850,786	52.14
Jan. ..	7,131,519	96.3	379,252	80.6	419,601	71.9	7,930,372	93.9	1,790,152	4.43
Feb. ..	6,142,178	92.0	255,565	60.2	395,502	75.0	6,793,245	89.1	1,698,311	4.00
Mar. .	6,747,680	91.3	265,726	56.5	473,630	81.1	7,487,036	88.7	1,690,076	4.43
Apr. ..	7,314,733	102.2	407,909	89.5	490,030	86.7	8,212,672	100.4	1,914,376	4.29
May ..	7,597,837	102.8	437,006	92.9	517,044	88.6	8,551,887	101.3	1,930,449	4.43
June ..	7,218,570	100.9	406,944	89.3	506,001	89.5	8,131,515	99.4	1,895,458	4.29
July ..	7,220,214	96.9	380,317	79.8	470,763	78.4	8,071,294	94.7	1,826,085	4.42
Aug. .	7,315,215	98.0	405,118	84.8	509,984	84.7	8,230,317	96.3	1,857,859	4.43
Sept. .	7,258,961	100.7	409,216	88.7	525,017	90.3	8,193,194	99.3	1,914,298	4.28
Oct. ..	7,731,280	103.6	436,835	91.5	571,980	95.0	8,740,095	102.3	1,972,933	4.43
Nov. ..	7,108,286	98.3	370,659	80.1	528,083	90.6	8,007,028	96.8	1,866,440	4.29
1949 ..	70,248,803	82.8	3,946,656	76.0	3,782,717	61.9	77,978,176	81.1	1,495,554	52.14
Jan. ..	7,289,865	101.2	408,552	92.6	498,973	96.1	8,197,390	100.4	1,850,427	4.43
Feb. ..	6,635,765	102.0	379,698	95.3	478,479	102.0	7,493,942	101.6	1,873,485	4.00
Mar. .	7,476,139	103.7	430,176	97.5	495,481	95.4	8,401,796	102.9	1,896,568	4.43
Apr. ..	7,017,712	100.6	404,095	94.6	374,358	74.4	7,796,165	98.6	1,817,288	4.29
May ..	6,891,293	95.6	400,741	90.9	306,956	59.1	7,598,990	93.0	1,715,348	4.43
June ..	5,956,402	85.4	349,196	81.8	199,058	39.6	6,504,656	82.2	1,516,237	4.29
July ..	5,309,060	73.8	300,236	68.2	175,535	33.9	5,784,831	71.0	1,308,785	4.42
Aug. .	6,103,326	84.7	355,335	80.6	264,110	50.9	6,722,771	82.3	1,517,556	4.43
Sept. .	5,994,100	86.1	350,282	82.2	253,553	50.5	6,597,935	83.6	1,541,574	4.28
Oct. ..	814,618	11.3	.....	...	113,729	21.9	928,347	11.4	209,559	4.43
Nov. ..	3,506,870	54.6	172,270	40.3	243,989	48.5	4,223,129	53.4	984,412	4.29
Dec. ..	6,953,653	96.7	396,075	90.0	378,496	73.0	7,728,224	94.8	1,748,467	4.42

PIG IRON†

PRODUCTION and CAPACITY

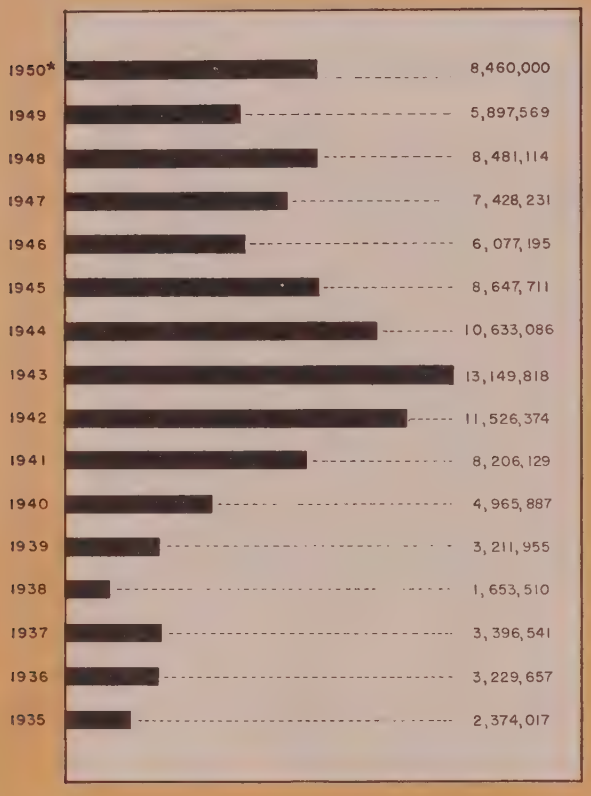
Net Tons

	Capacity	Production	%
1950	71,621,730	65,704,000*	91.7
January		5,293,596	87.1
February		4,172,983	76.1
March		4,601,041	75.7
April		5,577,020	94.8
May		5,855,348	96.4
June		5,633,451	95.8
July		5,878,945	96.8
August		5,770,363	94.8
September		5,697,323	96.9
October		5,924,427	97.4
November		.....	...
December		.....	...
1949	70,541,850	54,175,534	76.8
1948	67,438,930	61,043,806	90.5
1947	65,709,200	59,314,348	90.3
1946	67,340,590	45,547,907	67.6
1945	67,313,890	54,166,482	80.5
1944	67,921,410	62,072,683	91.4
1943	64,188,220	61,920,314	96.5
1942	60,606,850	60,115,387	99.2
1941	57,774,640	56,070,506	97.1
1940	55,723,640	46,979,091	84.3
1939	56,325,830	35,396,478	62.8
1938	56,782,208	21,182,569	37.3
1937	55,557,305	41,171,187	74.1
1936	55,854,280	34,476,170	61.7
1935	57,097,870	23,703,915	41.5

* Estimated by STEEL. † Including ferro-alloys made in blast furnaces.
American Iron & Steel Institute.

ALLOY STEEL PRODUCTION

Total Ingots and Castings—Net Tons



ALLOY STEEL PRODUCTION BY PROCESSES

Ingots and Castings—Net Tons

	Open-hearth					
	Basic	Acid	Total	Bessemer	Crucible	Electric
1950‡	.....	.....	4,801,701	....	†	2,188,539
1949	4,192,344	105,550	4,297,894	....	†	1,599,675
1948	6,285,054	128,915	6,413,969	....	†	2,067,145
1947	5,520,540	128,754	5,649,294	....	†	1,778,937
1946	4,325,657	115,711	4,441,368	....	†	1,635,827
1945	5,572,353	274,889	5,847,242	....	18	2,800,451
1944	6,494,627	515,662	7,010,289	....	23	3,622,774
1943	8,539,523	677,416	9,216,939	....	136	3,932,743
1942	7,524,209	608,867	8,133,076	....	522	3,392,776
1941	5,306,415	433,240	5,739,655	3,890	933	2,461,651
1940	3,421,961	252,965	3,674,926	3,990	255	1,286,716
1939	2,302,273	156,581	2,458,854	3,486	231	749,384
1938	1,179,031	102,089	1,281,120	13	5	372,372
1937	2,559,200	164,455	2,723,655	....	270	672,616
1936	2,508,671	129,658	2,638,329	....	234	591,094
1935	1,829,566	82,208	1,911,774	....	172	462,071
1934	1,431,744	38,685	1,470,429	60	115	335,144

‡ First ten months.
† Included with electric steel.
American Iron & Steel Institute • Estimated

Stainless Steel Production

Net Tons of Ingots

Type Number	1949	1948	Type Number	1949	1948
301	34,150	61,565	414	2,021	5,56
302	94,956	145,426	416	9,348	16,26
302B	397	1,523	420	3,260	4,86
303	9,178	14,633	430	122,353	122,42
304	70,711	100,966	430F	885	1,52
308	1,973	2,947	431	1,370	1,12
309	2,593	4,902	440A	1,359	1,43
310	4,596	5,663	440B	567	2
316	20,290	28,622	440C	960	1,2
321	5,575	7,528	442	298	3
347	26,710	33,346	443	...	
403	5,613	6,423	446	2,608	2,5
405	2,179	4,126	All Other .	13,349	13,9
406	1,622	2,580			
410	16,172	25,614	Total ..	455,093	617,3

American Iron & Steel Institute

Steel Castings

Shipments for Sale—Net Tons

	1950	1949	1948	Yearly Totals	
Jan. ...	57,996	103,503	108,282	1947	1,203,5
Feb. ...	62,045	99,425	107,762	1946	1,047,3
Mar. ...	77,588	102,027	125,550	1945	1,490,2
Apr. ...	75,133	83,277	114,896	1944	1,843,3
May ...	83,845	75,537	111,616	1943	1,928,6
June ...	94,637	84,112	117,794	1942	1,679,1
July ...	68,874	50,124	87,927	1941	1,316,0
Aug. ...	94,413	59,412	107,538	1940	797,9
Sept. ...	96,738	55,853	112,551	1939	594,1
Oct. ...	109,660	48,263	114,819	1938	342,7
Nov. ...	.....	50,685	110,275	1937	1,019,8
Dec. ...	.....	53,079	116,285	1936	805,6
				1935	398,9
Total .	.....	865,297	1,335,295		

Gray Iron Castings

Shipments—Net Tons

	1950	1949	1948	1947
Jan.	913,321	1,040,343	1,064,335	1,077,8
Feb.	864,189	986,591	1,024,450	1,009,9
Mar.	995,782	1,074,704	1,169,085	1,089,8
Apr.	981,126	929,307	1,051,083	1,097,1
May	1,095,111	866,631	992,692	1,097,3
June	1,136,129	905,573	1,072,040	1,038,3
July	961,450	696,915	914,464	912,9
Aug.	1,201,569	872,013	1,050,948	951,8
Sept.	1,159,240	880,647	1,088,051	1,025,0
Oct.	.....	715,685	1,148,422	1,154,1
Nov.	.....	718,703	1,099,827	1,020,2
Dec.	.....	862,172	1,110,512	1,066,2
Total ..	.....	10,549,284	12,785,909	12,540,9

1946 ..10,269,657 1945 .. 9,578,295 1944 .. 9,794,5

Malleable Iron Castings

Shipments—Net Tons

	1950	1949	1948	Yearly Total
Jan.	62,874	71,876	77,927	1947.. 895,0
Feb.	60,386	66,744	75,225	1946.. 752,0
Mar.	66,259	72,052	86,767	1945.. 790,7
Apr.	69,822	61,317	80,602	1944.. 878,2
May	76,161	54,572	76,078	1943.. 844,0
June	82,345	59,597	81,747	1942.. 746,0
July	67,514	44,360	64,995	1941.. 832,2
Aug.	86,021	58,121	73,272	1940.. 556,2
Sept.	82,479	60,723	77,815	1939.. 466,0
Oct.	89,968	57,150	81,761	1938.. 296,4
Nov.	.....	49,439	77,194	1937.. 596,0
Dec.	.....	57,379	79,882	1936.. 554,0
				1935.. 455,2
Total ...	.....	713,330	933,265	

Steel Forgings

Shipments for Sale—Net Tons

	1950	1949	1948	19
Jan.	92,994	124,383	118,534	116,
Feb.	92,547	111,024	116,676	111,
Mar.	108,677	119,839	131,111	115,
Apr.	99,193	104,108	114,314	121,
May	113,657	91,775	108,546	115,
June	117,333	100,756	119,165	110,
July	94,929	70,129	97,281	92,
Aug.	123,608	97,472	110,679	98,
Sept.	122,408	88,417	120,500	108,
Oct.	136,737	81,978	122,873	123,
Nov.	.....	72,859	123,657	103,
Dec.	.....	78,266	131,353	116,
Total	.....	1,140,306	1,414,689	1,333,

U. S. Bureau of the Census

Distribution

METALWORKING FACTS AND FIGURES

FINISHED STEEL DISTRIBUTION

by Market Classifications

(All Grades, Net Tons)

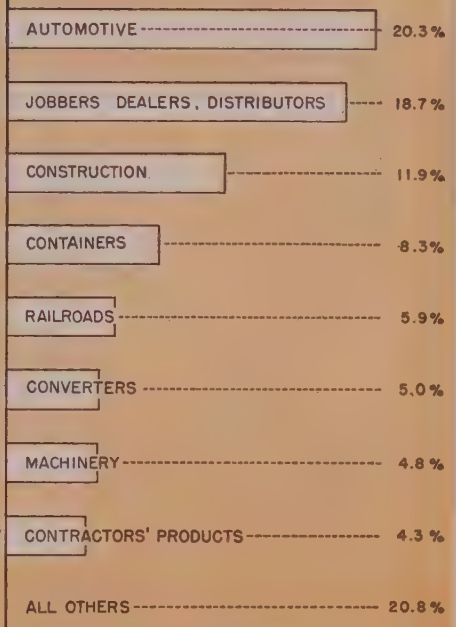
	12 mos. 1950*	12 mos. 1949	12 mos. 1948	12 mos. 1947
Automotive	14,496,230	10,962,894	10,220,982	9,273,363
Jobbers, Dealers, Distributors	13,353,670	10,219,983	11,405,749	10,484,144
Construction, including Maintenance	8,497,790	7,477,953	7,277,018	6,657,205
Containers	5,927,030	4,655,635	5,302,373	5,076,170
Rail Transportation	4,213,190	3,655,406	5,225,535	4,879,879
Converters and Processors	3,570,500	2,504,168	3,348,414	2,772,163
Machinery, Indus. Equip. & Tools	3,427,680	2,708,633	3,188,718	3,031,719
Contractors' Products	3,070,630	2,124,806	2,507,977	2,243,399
Export	2,499,350	3,517,971	3,244,888	4,206,692
Appliances, Utensils and Cutlery	2,070,890	1,322,922	1,959,878	1,564,722
Other Domestic & Commercial Equip.	1,785,250	1,325,940	1,713,806	1,680,259
Electrical Machinery and Equip.	1,713,840	1,209,027	1,594,700	1,595,520
Agricultural	1,571,020	1,491,085	1,426,943	1,244,548
Bolts, Nuts, Rivets, Screws	1,428,200	874,594	1,284,653	1,293,027
Unclassified	1,285,380	1,568,406	3,577,695	4,660,795
Forgings (other than Automotive)	1,071,150	821,570	938,838	741,044
Oil and Gas Drilling	571,280	600,205	684,478	930,731
Shipbuilding, Marine Equipment	285,640	668,694	649,613	337,961
Mining, Quarrying, Lumbering	285,640	271,872	329,090	287,670
Ordnance, Other Military	214,230	81,150	56,029	56,908
Aircraft	71,410	41,096	35,761	39,231
Total	71,410,000	58,104,010	65,973,138	63,057,150

American Iron & Steel Institute

* Estimated by STEEL on basis of actual shipments in first 9 months.

WHERE THE STEEL GOES

1950 – ESTIMATED



DISTRIBUTION

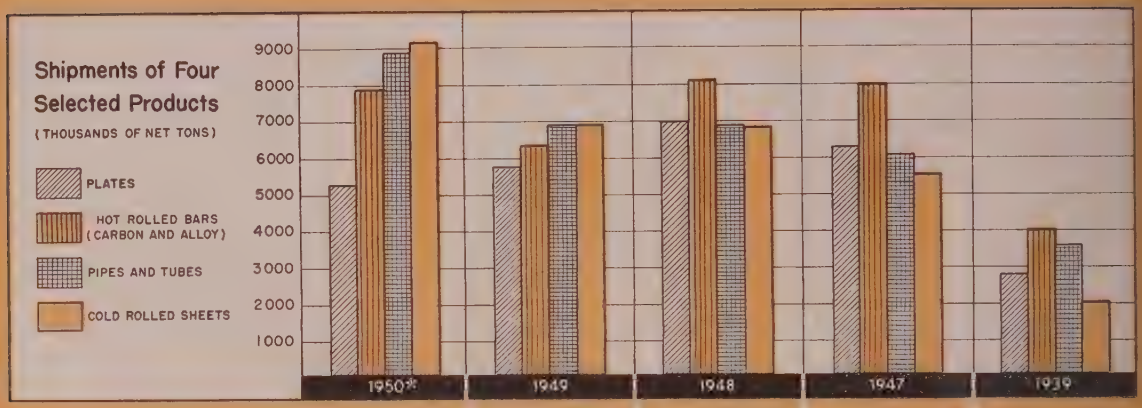
By Market Classifications	STAINLESS STEEL (Net Tons) 9 mos. 1950	12 mos. 1949	12 mos. 1948	ALLOY STEEL (Net Tons) 9 mos. 1950	12 mos. 1949	12 mos. 1948	CARBON STEEL (Net Tons) 9 mos. 1950	12 mos. 1949	12 mos. 1948
verters and Processors	30,205	21,079	23,104	51,816	61,590	76,887	2,554,918	2,421,499	3,248,423
gings (other than Automotive)	6,363	4,906	3,614	279,847	276,379	327,454	483,371	540,285	607,770
ts, Nuts, Rivets, Screws	2,738	2,317	2,901	55,705	38,869	58,340	989,612	833,408	1,223,412
bers, Dealers, Distributors	78,636	51,533	75,101	233,017	262,647	380,728	9,546,411	9,905,803	10,949,920
nstruction, including Maintenance	3,495	7,067	3,261	57,124	77,712	107,555	6,188,707	7,393,174	7,166,202
ntractors' Products	8,084	4,986	6,888	31,047	43,563	68,046	2,240,885	2,076,257	2,433,043
tomotive	58,402	53,359	50,905	1,396,169	1,410,692	1,590,480	9,275,106	9,498,843	8,579,597
l Transportation	3,068	3,936	9,914	103,004	124,049	232,281	3,002,267	3,527,421	4,983,340
pbuilding, Marine Equip.	516	653	878	14,502	23,832	20,945	209,469	644,209	627,790
rcraft	7,244	9,048	6,799	14,781	20,896	14,408	7,666	11,152	14,554
and Gas Drilling	526	199	254	98,519	112,601	167,664	340,104	487,405	516,560
ning, Quarrying, Lumbering	294	428	452	11,323	21,312	25,280	188,637	250,132	303,358
ricultural	213	270	402	35,612	37,580	68,679	1,108,518	1,453,235	1,357,862
chinery, Indus. Equip. & Tools	17,885	18,337	24,553	380,442	373,855	469,821	2,150,018	2,316,441	2,694,344
ectrical Machinery and Equip.	11,637	4,348	5,141	363,866	315,723	480,324	902,420	888,956	1,109,235
pliances, Utensils, Cutlery	34,308	27,289	42,741	31,623	22,906	45,192	1,478,450	1,272,727	1,871,945
her Domestic & Commercial Equip.	7,162	5,569	7,773	17,648	31,299	46,452	1,284,946	1,289,072	1,659,581
ntainers	3,577	3,149	6,288	10,078	15,096	25,177	4,373,900	4,637,390	5,270,908
dnance, Other Military	1,006	959	620	21,063	10,829	4,164	69,247	69,362	51,245
nclassified	36,728	33,205	41,492	89,057	78,467	363,841	858,592	1,456,734	3,172,362
xport	8,923	15,040	11,885	63,883	100,919	107,455	1,769,281	3,402,012	3,125,548
Total	321,010	267,677	324,966	3,360,126	3,460,816	4,681,173	49,022,525	54,375,517	60,966,999

merican Iron & Steel Institute

Steel Shipments

METALWORKING FACTS AND FIGURES

SHIPMENTS OF STEEL PRODUCTS



Steel Products—Net tons	Shipments	%	Shipments	%	Shipments	%	Shipments	%	Shipments	%
Ingots, blooms, slabs, billets, tube rounds, sheet and tin bars, etc.	2,927,810	4.1	2,261,285	3.9	3,150,754	4.8	2,966,748	4.7	1,305,866	3.7
Structural shapes (heavy)	4,141,780	5.8	3,669,503	6.3	4,255,355	6.5	4,436,129	7.0	2,544,515	7.3
Steel piling	357,050	0.5	301,824	0.5	299,537	0.5	324,224	0.5	171,428	0.5
Plates (sheared and universal)	5,284,340	7.4	5,759,065	9.9	7,000,199	10.6	6,345,216	10.1	2,793,798	8.0
Skelp	142,820	0.2	118,533	0.2	75,252	0.1	160,989	0.3	226,508	0.6
Rails—Standard (over 60 lb)	1,785,250	2.5	1,772,734	3.0	1,976,520	3.0	2,207,146	3.5	1,161,988	3.3
All other	142,820	0.2	117,154	0.2	214,880	0.3	211,900	0.3	125,109	0.4
Joint bars and tie plates	571,280	0.8	491,896	0.8	626,573	1.0	678,702	1.1	466,247	1.3
Track spikes	142,820	0.2	95,345	0.2	145,830	0.2	163,746	0.3	119,719	0.3
Hot-rolled bars—Carbon	.....	....	.....	....	6,196,444	9.4	6,242,416	9.9	3,292,876	9.4
Alloy	.....	....	.....	....	1,927,309	2.9	1,741,432	2.8	702,322	2.0
Total carbon and alloy	7,926,510	11.1	6,416,102	11.0	8,123,753	12.3	7,983,848	12.7	3,995,198	11.4
Reinforcing—New billet	.....	....	.....	....	1,329,945	2.0	1,277,075	2.0	1,038,949	3.0
Reinforcing—Rerolled	.....	....	.....	....	212,021	0.3	175,833	0.3	175,253	0.5
Reinforcing—Total	1,642,430	2.3	1,572,588	2.7	.....	....	.....	....	.....	....
Cold-finished bars—Carbon	.....	....	.....	....	1,349,719	2.0	1,426,701	2.3	592,514	1.7
Alloy	.....	....	.....	....	244,248	0.4	218,802	0.3	66,384	0.2
Total carbon & alloy	1,642,430	2.3	1,213,052	2.1	1,593,967	2.4	1,645,503	2.6	658,898	1.9
Tool steel bars	71,410	0.1	57,395	0.1	88,376	0.1	87,279	0.1	45,117	0.1
Pipes and tubes—Total	8,926,250	12.5	6,935,220	12.0	6,881,549	10.4	6,117,884	9.7	3,505,582	10.0
Buttweld	.....	....	.....	....	2,045,361	3.1	1,706,415	2.7	952,974	2.7
Lapweld	.....	....	.....	....	339,633	0.5	389,762	0.6	358,919	1.0
Electricweld	.....	....	.....	....	1,572,139	2.4	1,122,350	1.8	267,312	0.8
Seamless	.....	....	.....	....	2,924,416	4.4	2,082,686	3.3	1,686,665	4.8
Conduit and miscellaneous	.....	....	218,737	0.4	.....	....	155,335	0.2	78,850	0.2
Mechanical and pressure tubing	928,330	1.3	617,663	1.1	.....	....	661,336	1.1	160,862	0.5
Pipe—Standard	2,570,760	3.6	2,090,445	3.6	.....	....	.....	....	.....	....
Pipe—Line	3,713,320	5.2	2,534,423	4.4	.....	....	.....	....	.....	....
Pipe—Oil country goods	1,713,840	2.4	1,365,982	2.3	.....	....	.....	....	.....	....
Tubes—Boiler	.....	....	107,970	0.2	.....	....	.....	....	.....	....
Wire rods	856,920	1.2	570,397	1.0	610,348	0.9	667,282	1.1	550,040	1.6
Wire—Drawn	2,784,990	3.9	2,138,878	3.7	2,673,276	4.1	2,590,963	4.1	1,354,992	3.9
Nails and staples	856,920	1.2	731,356	1.3	859,540	1.3	799,436	1.3	678,786	1.9
Barbed and twisted	214,230	0.3	215,047	0.4	254,629	0.4	256,991	0.4	231,021	0.7
Woven wire fence	499,870	0.7	358,162	0.6	399,457	0.6	407,295	0.6	273,596	0.8
Bale ties	71,410	0.1	42,828	0.1	113,892	0.2	119,917	0.2	59,547	0.1
All other wire products	.....	....	.....	....	.....	....	.....	....	5,766	....
Fence posts	.....	....	.....	....	.....	....	.....	....	60,439	0.1
Black plate—Total	499,870	0.7	452,041	0.8	.....	....	.....	....	.....	....
Ordinary	.....	....	.....	....	821,398	1.3	801,745	1.3	269,341	0.8
Chemically treated	.....	....	.....	....	17,268	....	19,252	....		
Tin and terne plate—Hot dipped	1,928,070	2.7	1,699,355	2.9	2,167,912	3.3	2,093,149	3.3	2,561,451	7.3
Electrolytic	2,927,810	4.1	1,993,468	3.4	1,784,288	2.7	1,617,659	2.6		
Sheets—Hot-rolled	7,783,690	10.9	6,192,610	10.7	7,786,056	11.8	7,891,798	12.5	5,087,886	14.6
Cold-rolled	9,211,890	12.9	6,886,946	11.8	6,867,775	10.4	5,504,578	8.7	2,021,859	6.1
Galvanized	2,356,530	3.3	1,755,067	3.0	1,643,337	2.5	1,609,881	2.5	1,394,922	4.0
Long terne	.....	....	151,118	0.3	.....	....	.....	....	.....	....
Enameling	285,640	0.4	162,815	0.3	.....	....	.....	....	.....	....
All other coated	214,230	0.3	.....	....	.....	....	.....	....	.....	....
Electrical (sheets and strip)	714,100	1.0	379,180	0.6	.....	....	.....	....	.....	....
Strip—Hot-rolled	2,285,120	3.2	1,674,818	2.9	1,662,787	2.5	1,740,085	2.7	1,160,513	3.3
Cold-rolled	1,785,250	2.5	1,465,297	2.5	1,783,383	2.7	1,613,005	2.6	676,397	1.9
Wheels	285,640	0.4	285,733	0.5	337,376	0.5	356,873	0.6	150,750	0.4
Axles	142,820	0.2	159,628	0.3	215,905	0.3	185,019	0.3	73,970	0.2
All other	.....	....	7,570	0.0	.....	....	.....	....	9,724	....
Total steel products	71,410,000	100.0	58,104,010	100.0	65,973,138	100.0	63,057,150	100.0	34,955,175	100.0

American Iron & Steel Institute

* Estimated

CONTAINERS AND CLOSURES

Heavy Steel Barrels and Drums

Shipments for Sale—Number of Units

	1950	1949	1948
...	1,634,847	2,065,302	2,239,132
...	1,757,558	1,801,427	2,097,649
...	2,095,076	1,917,029	2,516,252
...	1,720,615	1,744,641	2,290,066
...	1,967,400	1,921,169	2,018,503
...	2,088,847	2,086,560	2,248,834
...	2,127,548	1,832,862	2,084,272
...	2,703,539	1,989,955	2,305,825
...	2,435,257	2,419,428	2,165,008
...	.....	1,693,792	2,336,268
...	.....	1,681,785	2,306,601
...	.....	1,955,688	2,461,307

YEARLY TOTALS

...	23,109,638	1946 ...	22,729,346
...	27,069,717	1945 ...	22,251,101
...	27,062,063	1944 ...	19,931,227

Light Steel Barrels and Drums

Shipments for Sale—Number of Units

	1950	1949	1948
...	513,424	508,934	613,305
...	532,975	442,635	563,115
...	580,987	429,751	655,552
...	521,607	447,014	642,957
...	646,127	476,101	602,671
...	713,431	558,392	683,450
...	690,365	515,359	592,658
...	790,923	574,155	654,319
...	675,801	576,457	575,547
...	.....	518,308	564,650
...	.....	531,476	570,123
...	.....	501,331	627,965

YEARLY TOTALS

...	6,079,913	1946 ...	6,432,138
...	7,346,312	1945 ...	6,564,746
...	6,032,204	1944 ...	5,173,000

Steel Shipping Packages, Kegs and Pails

Shipments for Sale—Number of Units

	1950	1949	1948
...	4,383,067	3,599,421	4,308,873
...	3,903,432	3,512,127	3,948,134
...	4,796,477	3,861,869	5,196,356
...	4,663,790	3,871,620	4,721,994
...	4,882,519	4,326,836	4,381,507
...	6,017,088	4,499,699	4,850,644
...	5,554,599	4,392,559	4,410,385
...	6,804,567	5,375,213	5,341,249
...	6,205,583	5,531,939	5,304,464
...	.....	4,938,461	5,339,017
...	.....	4,292,483	4,831,164
...	.....	4,558,943	4,621,148

YEARLY TOTALS

...	52,761,170	1947 ...	57,581,115
...	57,254,935	1946 ...	51,808,792
		1945 ...	57,698,050

Metal Cans

Tons of Steel Consumed in Shipments for Sale

	1950	1949	1948
...	176,582	157,631	182,356
...	163,010	163,389	170,825
...	192,993	172,320	170,289
...	187,986	169,194	165,749
...	241,985	189,024	175,915
...	312,661	259,026	239,309
...	364,504	282,977	272,994
...	498,369	444,976	350,404
...	382,891	371,691	351,567
...	313,218	252,522	258,316
...	.....	198,034	202,508
...	.....	184,918	230,872

YEARLY TOTALS

...	2,845,702	1946 ...	2,348,681
...	2,771,104	1945 ...	*2,275,438
...	2,499,621	1944 ...	*1,760,855

U. S. Bureau of the Census
*Estimated.

STEEL & IRON REQUIRED FOR MODERN-DAY PRODUCTS

PRODUCT	STEEL LB	IRON LB
Automobile	3,545	....
Combine, Grain	5,579	1,251
Freight Car:		
Box (50-ton capacity)	35,540	6,000
Covered Hopper (70-ton capacity)	52,940	..
Flat (50-ton capacity)	41,660	6,000
Hopper (50-ton capacity)	35,920	6,000
Ore (70-ton capacity)	42,300	..
Refrigerator (40-ton capacity)	38,340	5,600
House, Six-Room (Total)	8,482	...
Bathroom	300	.
Conduit	140	.
Doors, Steel	160	.
Flashing & miscellaneous sheets	200	.
Frames and sills	480	..
Gutters and downspouts	475	.
Hardware	90	..
Heating equipment	640	...
Kitchen	800	.
Lath	1,800	.
Laundry tubs	10	..
Nails and wire	600	..
Pipe, Gas, Water and Heating	1,200	.
Radiator grilles	75	..
Screen	32	.
Structural shapes and columns	680	..
Windows	800	...
Lathe, Turret	3,856	4,200
Lawn Mower	28	..
Locomotive, Diesel-Electric	191,000	9,700
Piano	28	194
Printing Press, Four-Color Sheet Fed Gravure	53,400	57,500
Refrigerator	172	..
Tractor, Farm	1,543	....
Truck, Railroad Freight Car	6,783	85
Truck, Railroad Passenger Car	18,236	224
Washing Machine	38	....

American Iron & Steel Institute

Air Conditioning, Commercial Refrigeration Equipment

Factory Shipments—Number of Units and Value in Thousands of Dollars

	CONDENSING UNITS		COMPRESSORS, COMPRESSOR UNITS		ICE-MAKING MACHINES	
	Number	Value	Number	Value	Number	Value
1949	610,341	$53,534	601,810	$29,771	6,523	$4,434
1948	841,609	73,443	459,390	33,493	5,947	5,266
1947	1,039,772	98,296	n.a.	34,586	7,822	3,122
1946	755,538	55,379	191,770	15,377	n.a.	n.a.
1945	354,401	36,902	107,340	9,578	2,805	4,044
1944	189,578	21,872	78,925	6,633	3,665	3,351

	CENTRIFUGAL-REFRIGERATION SYSTEMS		HEAT-EXCHANGER EQUIPMENT		SELF-CONTAINED AIR-CONDITIONING UNITS	
	Number	Value	Number	Value	Number	Value
1949	285	$8,189	.....	$40,352	123,407	$49,980
1948	361	10,351	.....	48,552	111,620	49,008
1947	563	7,889	.....	63,025	74,976	39,509
1946	312	6,593	.....	40,451	47,664	19,500
1945	185	2,994	.....	22,422	14,973	11,230
1944	70	1,736	.....	17,606	n.a.	n.a.

U. S. Bureau of the Census

n.a. = Not available

Prices

METALWORKING FACTS AND FIGURES

Beehive Metallurgical Coke

Average Price—Net Ton

	1950	1949	1948	1947
Connellsville, furnace	$14.06	$13.79	$13.55	$10.51
Connellsville, foundry	15.88	16.27	15.95	12.27
New River, foundry	18.83	17.35	14.98	12.27
Wise county, foundry	15.83	15.35	13.75	10.87
Wise county, furnace	15.08	14.60	13.07	10.38

Oven Foundry Coke

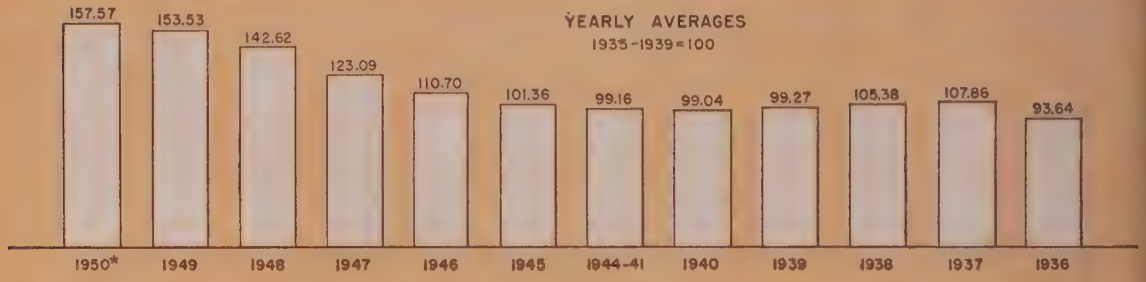
Average Price—Net Ton

Ovens	1950	1949	1948	1947
Kearny, N.J.	$22.18	$21.98	$20.47	$16.08
Milwaukee	21.18	20.94	20.13	16.96
Chicago	22.00	20.19	19.38	16.23

Lake Superior Iron Ore

(Per gross ton; 51½% iron)

	1950	1949	1948
Bessemer Old Range	$8.10	$7.60	$6.60
Bessemer Mesabi	7.85	7.35	6.35
Nonbessemer Old Range	7.95	7.45	6.45
Nonbessemer Mesabi	7.70	7.20	6.20
High Phosphorus	7.70	7.20	6.20



FINISHED STEEL—WEIGHTED PRICE COMPOSITE

(Based on average shipments and prices of the following products during 5-year base period 1935-1939: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip)

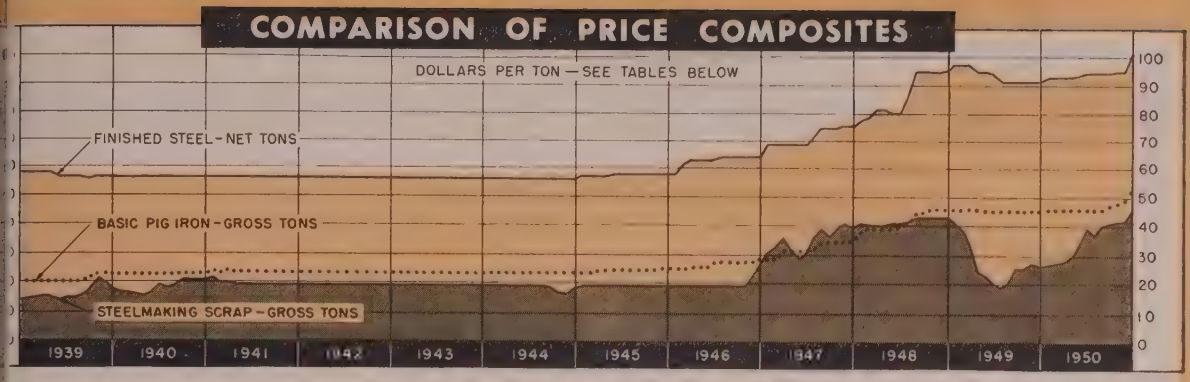
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1950	156.13	156.13	156.13	156.13	156.13	156.54	156.69	156.95	156.99	157.53	157.76	167.76*	157.57*
1949	155.05	155.05	154.85	154.01	152.90	152.90	152.80	152.52	152.52	152.52	152.52	154.75	153.53
1948	132.93	134.56	135.91	135.91	135.02	134.56	143.08	151.99	151.86	151.86	151.86	151.86	142.62
1947	117.90	118.67	118.67	118.67	118.67	118.67	120.39	128.96	128.96	128.96	129.28	129.28	123.09
1946	101.87	106.82	111.62	111.62	111.62	111.86	112.04	112.04	112.04	112.04	112.04	112.82	110.70
1945	100.32	100.65	100.65	100.65	101.10	101.78	101.78	101.85	101.87	101.87	101.87	101.87	101.36
1944	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1943	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1942	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1941	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1940	99.16	99.16	99.16	97.75	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.04
1939	100.50	100.50	100.50	100.50	99.07	98.46	98.42	98.42	98.42	98.54	98.78	99.16	99.27
1938	109.94	109.73	109.65	109.65	109.65	107.84	101.84	101.84	101.78	101.81	100.83	100.50	105.38
1937	98.44	98.49	108.25	109.60	109.94	109.94	109.94	109.94	109.94	109.94	109.94	109.94	107.86
1936	94.00	94.00	92.03	91.62	91.62	91.62	94.09	94.09	93.96	94.78	94.87	96.94	93.64

FINISHED STEEL—ANNUAL PRICE AVERAGES

(Per net ton, Pittsburgh)

	SHEETS			STRIP		Tin	BARS				Basic	Standard
	H.R.	C.R.	Gal.	H.R.	C.R.	Plate	H.R.	C.F.	Plates	Shapes	Wire	Nails
1950*	$67.50	$82.42	$88.67	$68.33	$86.29	$150.00	$69.42	$83.29	$70.33	$68.42	$91.13	$107.67
1949	65.22	80.08	88.00	67.75	84.33	155.00	67.55	80.04	68.75	65.24	84.05	105.92
1948	60.17	74.83	82.80	62.40	80.36	135.75	62.84	75.63	63.84	60.17	80.10	107.33
1947	52.60	67.03	74.05	52.60	67.03	116.00	54.60	67.03	55.53	52.53	70.67	84.44
1946	48.03	64.80	79.50	47.33	60.56	104.38	49.46	61.21	49.38	46.38	60.25	69.61
1945	43.92	61.00	73.50	42.00	56.00	100.00	44.25	53.83	44.50	42.00	53.83	57.08
1944	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1943	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1942	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1941	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1940	41.80	60.80	70.00	41.75	55.75	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1939	41.25	62.08	70.00	41.25	57.08	100.00	43.75	53.33	42.00	42.00	52.00	49.17
1938	45.42	66.67	72.92	45.25	61.08	106.00	47.00	56.00	43.50	43.50	55.00	52.00
1937	47.08	69.92	74.50	47.08	62.75	104.33	48.08	56.75	44.25	44.25	56.92	53.25
1936	38.25	60.00	63.25	38.25	52.33	105.00	38.50	44.42	37.00	37.00	48.17	42.83
1935	37.00	59.00	62.00	37.00	52.00	105.00	36.33	40.00	36.00	36.00	46.00	50.58
1934	37.08	58.75	61.25	37.17	51.75	105.00	36.17	42.00	35.67	35.67	45.42	50.58
1933	33.17	51.83	54.92	31.83	42.17	88.67	32.75	36.08	32.17	32.50	42.25	39.92
1932	34.08	55.17	56.33	28.92	39.75	93.75	31.67	35.75	31.67	31.67	44.00	39.00
1931	37.25	62.83	57.58	30.58	43.33	98.75	32.50	41.67	32.33	32.08	44.00	37.75
1930	40.17	73.00	63.00	33.67	49.33	103.75	34.42	41.83	34.17	34.17	46.67	42.50
1929	43.33	81.58	71.33	37.75	55.33	107.00	38.50	45.25	38.58	38.58	49.42	51.58
1928	40.75	80.67	71.75	36.92	56.83	105.25	37.50	44.00	37.50	37.50	49.00	51.58

* Estimated



FINISHED STEEL — ARITHMETICAL PRICE COMPOSITE

(In dollars per net ton, computed from industry-wide prices on carbon steel: Hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, and standard and line pipe. Based on basing point prices through June, 1948; mill prices for subsequent months.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1950	$92.92	$93.09	$93.18	$93.19	$93.65	$94.35	$94.36	$94.44	$94.50	$94.91	$95.09	$100.53†	$94.52†
1949	97.75	97.77	97.17	94.18	93.36	92.06	91.82	91.62	91.55	91.62	91.64	91.89	93.54
1948	78.26	79.86	81.14	81.14	80.27	80.27	86.18	95.05	95.05	95.05	95.16	95.50	86.91
1947	69.59	69.82	69.82	69.82	69.82	69.82	70.80	75.41	75.41	75.41	76.09	76.15	72.33
1946	58.27	60.91	63.54	63.54	63.54	64.09	64.45	64.45	64.45	64.45	64.45	64.75	63.41
1945	57.35	57.55	57.55	57.55	57.73	58.27	58.27	58.27	58.27	58.27	58.27	58.27	57.97
1944	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1943	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1942	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1941	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1940	56.73	56.73	56.73	56.08	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.68
1939	57.36	57.36	57.36	57.36	56.74	56.36	56.29	56.27	56.27	56.49	56.54	56.73	56.76

BASIC PIG IRON PRICE COMPOSITE

Average of basic pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1950	$45.70	$45.97	$45.97	$45.97	$45.97	$45.97	$45.97	$45.97	$47.08	$47.98	$49.04	$52.04	$46.97
1949	46.26	46.22	46.22	46.16	45.66	45.60	45.60	45.60	45.60	45.60	45.60	45.60	45.81
1948	38.50	39.30	39.34	39.21	39.66	40.49	41.42	44.12	44.62	46.19	46.29	46.29	42.12
1947	29.56	29.59	32.40	32.49	32.49	32.49	33.82	36.06	36.14	36.18	36.38	36.31	33.66
1946	24.75	24.75	25.13	25.50	25.50	27.50	27.50	27.50	27.50	27.50	27.50	29.10	26.64
1945	23.00	23.50	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.19	24.75	24.75	24.01
1944	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1943	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1942	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1941	22.80	22.95	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.02
1940	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.32	22.07
1939	20.05	20.05	20.05	20.05	20.05	20.05	20.05	20.05	21.05	22.05	22.05	22.05	20.68

MALLEABLE PIG IRON COMPOSITE

Average of malleable pig iron prices (per gross ton) at Bethlehem, Buffalo, Chicago, Cleveland, Neville Island, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1950	$47.27	$47.27	$47.27	$47.27	$47.27	$47.27	$47.33	$47.49	$48.15	$49.46	$50.27	$53.27	$48.30
1949	47.39	47.34	47.34	47.31	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.30
1948	39.58	40.39	40.45	40.29	40.70	41.54	42.32	44.87	45.30	47.20	47.41	47.41	43.12
1947	30.79	30.79	33.50	33.71	33.71	33.71	34.94	37.07	37.16	37.19	37.49	37.40	34.79
1946	26.04	26.04	26.41	26.79	26.79	28.79	28.79	28.79	28.79	28.79	28.79	30.36	27.93
1945	24.29	24.79	25.29	25.29	25.29	25.29	25.29	25.29	25.29	25.48	26.04	26.04	25.31
1944	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29
1943	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29	24.29

No. 2 FOUNDRY PIG IRON COMPOSITE

Average of No. 2 foundry pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1950	$46.20	$46.47	$46.47	$46.47	$46.47	$46.47	$46.57	$46.85	$47.55	$49.20	$49.54	$52.54	$47.57
1949	46.67	46.63	46.63	46.60	46.13	46.07	46.08	46.10	46.10	46.10	46.10	46.10	46.28
1948	38.94	39.77	39.81	39.68	40.10	40.96	41.83	44.47	44.58	46.50	46.69	46.69	42.50
1947	30.17	30.17	32.80	32.99	32.99	32.99	34.32	36.54	36.62	36.64	36.85	36.78	34.16
1946	25.42	25.42	25.80	26.17	26.17	28.17	28.17	28.17	28.17	28.17	28.17	29.73	27.31
1945	23.67	24.17	24.67	24.67	24.67	24.67	24.67	24.67	24.67	24.86	25.42	25.42	24.69
1944	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67
1943	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67	23.67

STEELMAKING SCRAP PRICE COMPOSITE

Average of No. 1 heavy melting steel scrap prices (per gross ton) at Pittsburgh, Chicago and eastern Pennsylvania.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1950	$26.93	$27.52	$28.23	$29.40	$33.82	$39.25	$37.04	$40.00	$40.93	$41.37	$41.33	$45.50†	$35.94†
1949	41.54	38.48	34.60	24.06	22.29	20.85	19.21	20.86	26.07	26.71	28.96	28.03	27.64
1948	40.75	40.48	40.21	40.41	40.67	40.67	41.43	43.33	43.33	43.25	43.25	43.25	41.75
1947	31.20	33.50	37.25	33.94	29.75	32.48	37.23	39.00	37.83	39.85	40.42	40.13	36.05
1946	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	22.22	27.69	20.13
1945	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1944	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	18.00	16.50	16.40	18.54	18.95
1943	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1942	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1941	21.00	20.05	20.15	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.50
1940	17.60	17.10	16.55	16.19	17.30	19.15	18.65	18.80	20.20	20.70	20.80	21.40	18.70
1939	14.90	14.95	15.15	14.80	14.10	14.60	14.90	15.35	18.15	21.55	20.15	17.95	16.40

† Preliminary

Prices

METALWORKING FACTS AND FIGURES

AVERAGE MONTHLY QUOTATIONS IN 1950

Finished Steel Prices are cents per pound unless otherwise noted; Coke, dollars per net ton; Other Products, dollars per gross ton. All prices are mill or furnace, unless otherwise noted. December figures subject to revision.

PITTSBURGH	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Structural Shapes	3.40c	3.40c	3.40c	3.40c	3.40c	3.40c	3.40c	3.40c	3.40c	3.40c	3.40c	3.65c
Plates	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.70
Bars, Hot-Rolled	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.70
Bars, Cold-Finished	4.125	4.125	4.125	4.125	4.125	4.125	4.125	4.125	4.125	4.15	4.15	4.55
Sheets, Hot-Rolled	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.60
Sheets, Cold-Rolled	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.35
Sheets, No. 10 Galvanized	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.80
Strip, Hot-Rolled	3.25	3.25	3.25	3.25	3.25	3.375	3.375	3.375	3.50	3.625	3.625	3.875
Strip, Cold-Rolled	4.15	4.15	4.15	4.15	4.15	4.325	4.325	4.325	4.325	4.375	4.50	4.85
Standard Spikes	5.54	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	6.15
Plain Wire	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.625	4.625	4.93
Wire Nails	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.45	5.45	6.00
Structural Rivets	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.85
Tin Plate, 1.50-pound coating (base box)	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
Steel Pipe, Buttweld, 1-3 in., % discount from list	47	47	47	47	47	47	47	47	47	47	47	42.5
Pig Iron, Bessemer, Neville Island	47.00	47.00	47.00	47.00	47.00	47.00	47.75	50.00	50.00	50.00	50.00	53.00
Pig Iron, Basic, Neville Island	46.00	46.00	46.00	46.00	46.00	46.00	....	....	....	....	....	....
Pig Iron, No. 2 Foundry, Neville Island	46.50	46.50	46.50	46.50	46.50	46.50	47.25	49.50	49.50	49.50	49.50	52.50
Pig Iron, Malleable, Neville Island	46.50	46.50	46.50	46.50	46.50	46.50	47.25	49.50	49.50	49.50	49.50	52.50
Blast Furnace Silvery Pig Iron, 9.01-9.50% Si, Jackson, O., furnace	58.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	58.00	59.50	59.50
Billets, Bessemer and Open-Hearth	53.00	53.00	53.00	53.00	53.00	53.00	53.00	53.00	53.00	53.00	53.00	56.00
Wire Rods	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	4.10
Furnace Coke, spot	13.25	13.25	13.85	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25
Foundry Coke, spot	15.50	15.50	15.80	16.00	15.80	15.50	15.50	15.50	16.00	16.50	16.50	16.50
Scrap, No. 1 Heavy Melting Steel	30.00	31.65	31.60	32.88	38.10	44.25	40.50	43.60	44.00	44.00	44.00	46.50
Scrap, Low Phosphorous	33.00	32.50	34.40	36.00	40.55	46.75	44.25	49.40	49.00	51.15	53.70	48.50
Scrap, No. 1 Cast	33.94	34.30	34.50	35.50	37.30	37.50	37.75	42.90	45.25	50.25	55.50	55.50

CHICAGO	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Bars, Steel	3.45c	3.45c	3.45c	3.45c	3.45c	3.45c	3.45c	3.45c	3.45c	3.45c	3.45c	3.70
Plates	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.70
Structural Shapes	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.60
Bars, Rail Steel	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.42	3.53	4.00	4.00	4.70
Sheets, Cold-Rolled	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.30
Pig Iron, No. 2 Foundry	$46.50	$46.50	$46.50	$46.50	$46.50	$46.50	$46.50	$46.50	$46.88	$49.50	$49.50	$52.50
Pig Iron, Malleable	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.50	46.88	48.30	49.50	52.50
Scrap, No. 1 Heavy Melting Steel	27.30	27.50	28.50	29.25	33.40	38.13	37.63	38.95	40.00	40.00	40.00	45.00
Scrap Rails for Rerolling	39.50	40.25	45.25	46.50	49.30	49.25	48.25	55.63	59.88	63.80	64.75	66.00
Scrap, No. 1 Machinery Cast	39.30	40.75	41.38	41.75	44.50	46.13	44.50	48.30	50.00	53.20	59.50	63.00

EASTERN PENNSYLVANIA	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Tank Plates, del. Philadelphia	3.665c	3.69c	3.69c	3.69c	3.69c	3.69c	3.69c	3.75c	3.79c	3.79c	3.79c	3.90
Structural Shapes, del. Philadelphia	3.42	3.42	3.42	3.42	3.42	3.42	3.46	3.62	3.65	3.65	3.65	3.90
Steel Bars, del. Philadelphia	3.93	3.93	3.93	3.93	3.98	3.93	3.93	3.93	3.93	3.93	3.93	4.15
Sheets, Hot-Rolled, del. Philadelphia	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.89
Pig Iron, Basic, del. Philadelphia	$49.44	$49.44	$49.44	$49.44	$49.44	$49.44	$49.44	$50.20	$50.39	$51.40	$53.39	$56.39
Pig Iron, No. 2 Foundry, del. Philadelphia	49.94	49.94	49.94	49.94	49.94	49.94	49.94	50.70	50.89	51.90	53.89	56.89
Pig Iron, Standard Low Phos, del. Philadelphia	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	60.00	63.00
Scrap, No. 1 Heavy Melting Steel	23.25	23.44	24.25	26.06	29.31	34.75	33.00	37.45	38.81	40.125	40.20	45.00
Scrap, No. 1 Cupola	31.75	30.125	31.40	33.75	34.50	35.10	36.00	37.65	41.00	48.50	51.80	52.50
Spiegeleisen, 19-21%, Palmerton, Pa., furnace	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	68.50	70.00	70.00	73.75

COAL CHEMICALS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Benzol, per gallon, producers' plants, tank lots	22.00c	22.00c	22.00c	22.00c	22.60c	25.00c	25.00c	25.00c	28.38c	31.00c	31.00c	31.00c
Toluol, one degree, per gallon, delivered, tank lots	21.88	21.88	21.88	21.88	21.90	22.00	22.00	22.00	24.50	24.50	24.50	24.50
Xylol, per gallon, delivered, tank lots	23.50	23.50	23.50	23.50	23.53	23.63	23.63	23.63	25.25	25.25	25.25	25.25
Phenol, per pound, producers' plants, less than carlots	14.00	14.13	14.25	14.25	14.25	14.25	14.25	14.25	18.00	18.00	18.00	18.00
Sulphate of Ammonia, per ton, bulk, f.o.b. Atlantic Seaboard	$45.00	$45.00	$45.00	$45.00	$41.10	$38.50	$38.50	$38.50	$38.50	$38.50	$38.50	$38.50

Nonferrous Prices

METALWORKING FACTS AND FIGURES

NONFERROUS METAL PRICES

(Cents per pound)

	Jan.	Feb.	Mar.	Apr.	May	June	1950 July	Aug.	Sept.	Oct.	Nov.	Dec.*	Yearly Averages 1950*	1949	1948
...per Sheets[1]	32.180	32.180	32.180	32.680	34.580	37.430	37.430	37.430	38.930	40.705	40.805	40.805	36.445	33.278	35.230
...per Rods	28.030	28.030	28.030	28.530	30.430	33.280	33.280	33.280	34.780	36.543	36.655	36.655	32.294	29.295	31.381
...per Tubing[1]	32.220	32.220	32.220	32.570	34.620	37.470	37.470	37.470	38.970	40.745	40.845	40.845	36.472	33.302	35.270
...low Brass Sheets[1]	28.690	28.690	28.690	29.150	31.210	34.190	34.190	34.190	35.945	37.404	37.570	37.570	33.124	30.327	31.751
...low Brass Rods[1]	23.190	23.190	23.190	23.590	25.414	28.540	28.540	28.540	30.348	31.779	31.995	31.995	27.526	26.321	28.700
...low Brass Tubing[1]	31.700	31.700	31.700	32.160	34.220	37.200	37.200	37.200	38.955	40.414	40.580	40.580	36.134	33.275	34.648
...nze Sheets[2]	31.610	31.610	31.610	32.095	34.040	36.930	36.930	36.930	38.505	40.185	40.305	40.305	35.921	32.838	34.753
...nze Rods[2]	31.300	31.300	31.300	31.785	33.730	36.620	36.620	36.620	38.195	39.875	39.995	39.995	35.611	32.540	34.443
...nze Tubing[2]	34.270	34.270	34.270	34.755	36.700	39.590	39.590	39.590	41.165	42.845	42.965	42.965	38.581	35.664	37.286
...el Silver Sheets[3]	42.270	42.270	42.270	42.655	44.488	48.390	48.390	48.390	49.778	51.058	51.240	51.240	46.870	43.564	44.183
...phor Bronze Sheets[4]	50.900	50.900	50.900	51.400	52.532	55.110	55.110	55.110	57.292	59.237	59.345	59.345	54.765	52.314	54.126
...n Sheets[1]	15.500	15.500	15.625	16.188	17.650	20.625	20.750	20.750	23.531	23.625	23.625	23.625	19.750	17.227	17.998
...ow Brass Wire[1]	28.980	28.980	28.980	29.440	31.500	34.480	34.480	34.480	36.235	37.694	37.860	37.860	33.414	30.638	32.065
...er Magnet Wire[5]	28.500	28.500	28.500	29.000	29.900	32.500	32.500	32.500	33.250	34.500	34.500	34.500	31.554	29.535	31.704
...herproof Copper Wire[6]	25.100	25.100	25.100	25.475	26.150	28.100	28.100	28.100	28.662	29.600	29.600	29.600	27.391	26.714	28.419
...Copper Wire[6]	22.670	22.670	22.670	23.170	24.070	26.670	26.670	26.670	27.420	28.670	29.045	29.045	25.787	25.183	28.060
...5-5 Brass Ingot[7]	17.500	17.500	17.500	17.875	18.800	21.875	21.969	23.800	25.500	27.100	29.000	29.000	22.285	17.273	20.382
...-10 Brass Ingot[8]	21.750	21.750	21.750	21.875	22.450	25.500	25.500	27.700	29.500	31.500	35.000	35.000	26.606	22.628	25.747
...-2 Brass Ingot[9]	25.250	25.250	25.250	25.375	25.950	29.000	29.000	33.300	35.000	39.700	44.500	44.500	31.840	26.297	29.504
...1 Yellow Ingot[10]	15.125	15.125	15.125	15.781	16.425	18.625	18.906	20.400	21.750	23.700	25.500	25.500	19.330	14.664	16.391

...b. mill, [2]90% Cu; f.o.b. mill. [3]18% Ni; f.o.b. mill. [4]Grade A; f.o.b. mill. [5]f.o.b. destination. [6]Carlots; f.o.b. eastern mill. [7]No. 115; delivered. [8]No. 305; delivered. [9]No. 215; delivered. [10]No. 405; delivered.

COPPER

Electrolytic; cents per lb, delivered Connecticut Valley

	1950	1949	1948	Yearly Averages
...	18.500	23.500	21.500	1950*..21.588
...	18.500	23.500	21.500	1949..19.499
...	18.500	23.486	21.500	1948..22.317
...	18.940	21.774	21.500	1947..21.215
...	19.962	18.045	21.500	1946..14.043
...	22.231	16.606	21.500	1945..12.000
...	22.500	17.279	21.574	1944..12.000
...	22.870	17.625	23.230	1943..12.000
...	23.500	17.625	23.500	1942..12.000
...	24.500	17.625	23.500	1941..12.000
...	24.500	18.427	23.500	1940..11.528
...	24.500*	18.500	23.500	1939..11.198

ZINC

...ne Western; cents per lb, East St. Louis

	1950	1949	1948	Yearly Averages
...	9.810	17.500	11.056	1950*..13.879
...	9.750	17.500	12.000	1949..12.152
...	9.944	17.056	12.000	1948..13.563
...	10.690	14.085	12.000	1947..10.500
...	11.990	11.880	12.000	1946..8.727
...	14.769	9.548	12.000	1945..8.250
...	15.000	9.346	12.444	1944..8.250
...	15.000	10.000	15.000	1943..8.250
...	17.100	10.058	15.000	1942..8.250
...	17.500	9.317	15.173	1941..7.478
...	17.500	9.760	16.580	1940..6.339
...	17.500*	9.769	17.500	1939..5.113

CADMIUM

Regular shapes; dollars per lb, del.

	1950	1949	1948	1947	1946
...	2.00	2.00	1.75	1.50	0.90
...	2.00	2.00	1.75	1.56	0.90
...	2.00	2.00	1.75	1.69	0.90
...	2.00	2.00	1.75	1.75	0.90
...	2.00	2.00	1.75	1.75	0.90
...	2.11	2.00	1.75	1.75	0.90
...	2.15	2.00	1.75	1.75	0.99
...	2.15	2.00	1.90	1.75	1.25
...	2.34	2.00	1.90	1.75	1.25
...	2.40	2.00	1.90	1.75	1.25
...	2.44	2.00	1.94	1.75	1.31
...	2.55	2.00	2.00	1.75	1.50
...erage	2.18	2.00	1.82	1.71	1.08

ANTIMONY

Domestic, bulk, carlots; cents per lb, f.o.b. Laredo, Tex.

	1950	1949	1948	Yrly Average
...	29.920	38.500	33.000	1950*..27.626
...	27.318	38.500	33.000	1949..36.875
...	24.600	38.500	33.000	1948..35.010
...	24.500	38.500	33.000	1947..31.922
...	24.500	38.500	33.700	1946..15.972
...	24.500	38.500	35.000	1945..14.500
...	24.500	38.500	35.000	1944..14.500
...	24.648	38.500	35.000	1943..14.500
...	31.620	38.500	35.000	1942..14.417
...	32.000	32.000	37.423	1941‡..16.500
...	32.000	32.000	38.500	1940‡..16.500
...	32.000*	32.000	38.500	1939‡..14.425

‡ Delivered New York

ALUMINUM

99% plus, ingots; cents per lb, f.o.b. shipping point

	1950	1949	1948	Yearly Averages
Jan. ...	17.000	17.000	15.000	1950*..17.695
Feb. ...	17.000	17.000	15.000	1949..17.000
Mar. ...	17.000	17.000	15.000	1948..15.764
Apr. ...	17.000	17.000	15.000	1947..15.000
May ...	17.192	17.000	15.000	1946..15.000
June ...	17.500	17.000	15.000	1945..15.000
July ...	17.500	17.000	15.000	1944..15.000
Aug. ...	17.500	17.000	15.000	1943..15.000
Sept. ...	17.680	17.000	15.000	1942..15.000
Oct. ...	18.970	17.000	15.000	1941..16.500
Nov. ...	19.000	17.000	15.000	1940..18.692
Dec. ...	19.000*	17.000	15.000	1939..20.000

LEAD

Common grade; cents per lb, St. Louis

	1950	1949	1948	Yearly Averages
Jan. ...	11.800	21.325	14.825	1950*..13.095
Feb. ...	11.800	21.325	14.825	1949..15.191
Mar. ...	10.763	18.825	14.825	1948..17.867
Apr. ...	10.420	15.017	17.037	1947..14.504
May ...	11.521	13.566	17.325	1946...7.957
June ...	11.608	11.850	17.325	1945...6.350
July ...	11.460	13.335	17.621	1944...6.350
Aug. ...	12.726	14.806	19.325	1943...6.350
Sept. ...	15.600	14.853	19.325	1942...6.331
Oct.	15.840	13.242	19.325	1941...5.643
Nov. ...	16.800	12.348	21.325	1940...5.029
Dec. ...	16.800*	11.800	21.325	1939...4.904

COBALT

97-98%; dollars per lb for 550 lb keg

	1950	1949	1948	1947	1945-46	1944
Jan.	1.80	1.65	1.65	1.50	1.50	2.11
Feb.	1.80	1.65	1.65	1.50	1.50	2.11
Mar.	1.80	1.65	1.65	1.50	1.50	2.11
Apr.	1.80	1.80	1.65	1.50	1.50	2.11
May	1.80	1.80	1.65	1.50	1.50	2.11
June	1.80	1.80	1.65	1.50	1.50	2.11
July	1.80	1.80	1.65	1.53	1.50	2.11
Aug.	1.80	1.80	1.65	1.65	1.50	2.11
Sept.	1.80	1.80	1.65	1.65	1.50	2.11
Oct.	1.80	1.80	1.65	1.65	1.50	2.11
Nov.	1.80	1.80	1.65	1.65	1.50	2.11
Dec.	1.80*	1.80	1.65	1.65	1.50	1.50
Av.	1.80*	1.76	1.65	1.57	1.50	2.06

SILVER

Open market, cents per fine oz, New York

	1950	1949	1948	Yearly Averages
Jan. ...	73.250	70.000	74.625	1950*..74.165
Feb. ...	73.250	70.838	74.625	1949..71.932
Mar. ...	73.120	71.500	74.625	1948..74.665
Apr. ...	77.750	71.500	74.625	1947..71.959
May ...	72.635	71.500	74.625	1946†..80.151
June ...	72.750	71.500	74.625	1945†..51.928
July ...	72.750	71.500	74.625	1944†..44.750
Aug. ...	72.750	71.889	73.790	1943†..44.750
Sept. ...	72.750	73.202	75.284	1942†..38.333
Oct.	74.980	73.250	77.226	1941†..34.783
Nov. ...	80.000	73.250	73.655	1940†..34.773
Dec. ...	80.000*	73.250	73.655	1939†..39.082

† As reported by Handy & Harman, New York.

NICKEL

Electrolytic Cathodes, 99.5%, base sizes, unpacked, cents per lb, f.o.b. refinery

	1950	1949	1948	Yearly Averages
Jan. ...	40.000	40.000	33.750	1950*..44.692
Feb.	40.000	40.000	33.750	1949..40.000
Mar. ...	40.000	40.000	33.750	1948..36.528
Apr. ...	40.000	40.000	35.750	1947..35.000
May ...	40.308	40.000	35.750	1946..31.850
June ...	48.000	40.000	33.750	1945..35.000
July ...	48.000	40.000	35.833	1944..35.000
Aug. ...	48.000	40.000	40.000	1943..35.000
Sept. ...	48.000	40.000	40.000	1942..35.000
Oct. ...	48.000	40.000	40.000	1941..35.000
Nov. ...	48.000	40.000	40.000	1940..35.000
Dec. ...	48.000*	40.000	40.000	1939..35.000

TIN

Straits, spot; cents per lb, New York

	1950	1949	1948	Yearly Averages
Jan. ...	76.020	103.000	94.000	1950*..95.073
Feb. ...	74.352	103.000	94.000	1949..99.996
Mar. ...	75.745	103.000	94.000	1948..99.250
Apr. ...	76.445	103.000	94.000	1947..77.975
May ...	77.500	103.000	94.000	1946..54.563
June ...	77.668	103.000	103.000	1945..52.000
July ...	89.680	103.000	103.000	1944..52.000
Aug. ...	102.120	103.000	103.000	1943..52.000
Sept. ...	101.250	101.654	103.000	1942..52.000
Oct.	113.390	95.505	103.000	1941..52.032
Nov. ...	137.710	89.823	103.000	1940..49.841
Dec. ...	139.000*	78.966	103.000	1939..49.027

IRIDIUM

Dollars per troy ounce

	1950	1949	1948	1947	1946
Jan. ..	105.00	112.50	85.00	112.00	165.00
Feb. ..	100.00	107.50	86.88	110.00	165.00
Mar. ..	100.00	105.00	97.50	106.50	165.00
Apr. ..	100.00	105.00	112.00	91.50	165.00
May ..	100.00	105.00	115.00	90.00	165.00
June ..	100.00	105.00	112.50	86.25	123.75
July ..	145.00	105.00	107.00	85.00	121.25
Aug. ..	176.00	105.00	115.00	85.00	125.00
Sept. .	220.00	105.00	114.50	85.00	125.00
Oct. ..	212.00	105.00	112.50	85.00	125.00
Nov. ..	200.00	105.00	112.50	85.00	125.00
Dec. ..	200.00*	105.00	112.50	85.00	123.75
Av. .	146.50*	105.83	106.91	92.19	141.15

PLATINUM

Dollars per ounce

	1950	1949	1948	1947	1946
Jan.	69.90	90.00	67.50	59.90	35.00
Feb.	67.50	86.75	70.50	59.50	35.00
Mar.	67.50	77.30	73.50	59.00	35.00
Apr.	67.50	73.50	94.70	61.50	35.00
May	67.50	73.50	99.50	61.20	35.00
June	67.50	71.70	85.50	57.25	49.63
July	73.50	70.50	87.90	54.50	68.50
Aug.	78.10	70.50	94.50	57.00	78.90
Sept.	98.25	70.50	94.50	67.50	86.50
Oct.	97.50	70.50	94.50	67.50	78.80
Nov.	91.50	70.50	94.50	67.50	70.50
Dec.	91.50*	70.50	93.50	67.50	65.00
Average ..	78.146*	74.65	87.55	61.65	56.07

* Estimated.

Nonferrous Metals

COPPER—BRASS

METALWORKING FACTS AND FIGURES

COPPER PRODUCTION, SHIPMENTS AND STOCKS

DOMESTIC STATISTICS—Net Tons

Period	PRODUCTION Primary	PRODUCTION Secondary	PRODUCTION Refined	Deliveries To Customers	Refined Stocks End of Period
1950					
11 Mos. ..	854,530	111,702	1,161,304	1,251,240	51,805
Jan.	73,625	12,025	95,229	111,668	101,070
Feb.	69,994	10,762	94,036	112,773	77,472
Mar.	78,928	11,430	113,464	123,054	60,276
Apr.	73,853	9,929	103,293	101,729	57,028
May	76,691	6,595	112,411	113,837	51,043
June	78,962	17,792	113,961	125,016	50,350
July	76,563	8,815	96,758	96,006	48,290
Aug.	80,620	12,518	108,465	112,107	50,952
Sept.	80,102	6,576	111,842	119,529	58,748
Oct.	82,750	7,792	110,435	121,806	56,945
Nov.	82,442	7,468	101,410	113,715	51,805
1949	772,968	135,052	1,056,463	1,031,595	116,027
1948	850,088	130,410	1,233,697	1,344,445	96,080
1947	871,391	105,307	1,196,393	1,383,666	76,035
1946	618,757	32,503	604,071	1,261,830	80,832
1945	792,126	49,541	843,113	1,517,842	76,512
1944	995,938	60,242	1,098,788	1,636,295	66,780
1943	1,111,022	83,677	1,206,871	1,643,677	52,121
1942	1,098,007	54,337	1,135,708	1,635,236	65,309

Copper Institute

FOREIGN STATISTICS—Net Tons

Period	PRODUCTION Primary	PRODUCTION Secondary	PRODUCTION Refined	Deliveries To Customers	Refined Stocks End of Period
1950					
11 Mos. .	1,236,057	10,983	1,030,144	822,962	137,096
Jan.	106,162	1,669	87,923	81,574	142,971
Feb.	110,089	549	83,501	69,193	144,893
Mar.	108,159	1,227	84,604	72,626	148,455
Apr.	104,073	1,004	89,369	72,047	150,444
May	117,691	758	98,082	83,305	144,650
June	106,491	1,615	91,145	64,566	136,482
July	119,938	933	94,609	69,062	140,366
Aug.	119,938	1,658	100,195	63,922	157,541
Sept.	105,798	616	93,507	85,809	133,379
Oct.	119,358	3,850	105,237	77,502	135,712
Nov.	116,939	437	101,972	83,356	137,096
1949	1,270,529	10,241	1,076,114	933,641	147,972

Total Domestic and Foreign

1950					
11 Mos. .	2,090,587	122,685	2,191,448	2,074,202	188,901
1949	2,043,515	145,293	2,132,577	1,965,236	263,999

Imports of Copper

Unrefined, Scrap, Refined—Net Tons

	1950	1949	1948	1947	1946	1945
Jan.	56,213	48,329	30,435	26,261	60,026	55,931
Feb.	61,378	59,158	46,638	26,114	15,583	84,260
Mar.	45,207	64,790	46,981	26,291	8,193	83,961
Apr.	34,520	48,702	37,727	23,203	25,666	79,490
May	66,117	48,802	33,271	40,138	31,193	80,818
June	87,222	46,570	46,840	52,527	20,510	72,470
July	29,347	33,829	46,684	37,524	35,755	114,562
Aug.	33,576	45,372	39,736	44,185	21,272	64,710
Sept.	36,298	38,176	35,423	41,596	25,182	70,422
Oct.	.....	37,231	36,947	44,045	32,503	82,367
Nov.	.....	41,786	35,491	36,902	33,182	50,860
Dec.	.....	59,054	52,222	54,513	45,431	56,469
Monthly Avg.	.....	47,650	40,700	37,775	29,541	74,693

U. S. Bureau of the Census

Exports of Copper

Refined and Manufactures—Net Tons

	1950	1949	1948	1947	1946	1
Jan.	12,165	21,041	18,013	14,921	12,427	14
Feb.	20,748	10,653	18,297	11,068	10,966	10
Mar.	19,021	15,415	15,043	13,467	7,336	12
Apr.	17,120	11,248	23,272	11,721	6,267	14
May	14,064	14,910	19,861	14,021	4,225	18
June	11,434	17,066	21,079	17,254	7,341	10
July	9,785	10,349	15,069	14,569	7,489	10
Aug.	12,230	8,695	20,623	21,606	9,173	6
Sept.	12,035	14,214	12,085	18,337	5,386	6
Oct.	.....	9,388	17,861	19,295	2,131	9
Nov.	.....	13,075	11,636	22,497	10,564	10
Dec.	.....	25,049	13,725	18,299	14,168	7
Monthly Avg.	.....	14,259	17,214	16,421	8,123	11

U. S. Bureau of the Census

Brass Ingot Shipments

Net Tons

	1950	1949	1948	1947
Jan.	18,874	19,456	26,998	27,841
Feb.	18,487	15,026	22,487	24,686
Mar.	22,494	14,550	24,282	27,477
Apr.	22,118	10,695	25,177	24,577
May	23,643	11,114	23,716	19,525
June	25,093	9,696	24,401	16,929
July	21,609	10,220	20,456	16,728
Aug.	29,689	14,194	24,098	18,589
Sept.	28,811	16,208	23,641	19,025
Oct.	32,240	18,036	21,559	22,806
Nov.	.....	18,488	21,731	21,666
Dec.	.....	17,960	20,954	23,862
Total	.....	175,643	279,500	263,711

Compiled by Ingot Brass & Bronze Industry, representing in excess of 95 per cent of brass and bronze industry

Copper and Copper-base Alloy Castings Shipments

Thousands of Pounds

	1950	1949	1948	1947
Jan.	65,585	75,978	85,432	101,776
Feb.	67,029	68,428	87,169	92,566
Mar.	80,442	69,714	96,344	94,530
Apr.	72,318	59,224	89,035	98,253
May	79,108	53,228	81,286	90,054
June	83,023	52,501	84,817	84,604
July	69,033	43,175	71,803	70,603
Aug.	94,013	57,961	81,976	75,060
Sept.	95,641	60,671	86,973	83,158
Oct.	.....	58,645	91,311	92,119
Nov.	.....	61,818	86,497	81,803
Dec.	.....	63,873	88,182	87,215

ANNUAL SHIPMENTS

1949.....	724,734	1946.....	1,065,596
1948.....	1,030,825	1945.....	1,008,000
1947.....	1,051,741	1944.....	1,446,200

U. S. Bureau of the Census * Estimated

Copper and Brass Mill Fabricator Statistics

(Summary of statistics which cover United States duty-free copper until Mar. 1, 1941; duty-foreign copper included thereafter; beginning January, 1947, copper from all sources, duty f Figures given in net tons.)

End of period:	DELIVERIES: Deliveries to Users (actual consump)	DELIVERIES: Producer Deliveries to Fabricators	STOCKS: Fabricators' Refined Stocks	STOCKS: Less Work-ing Stocks	STOCKS: Visible Supplies	STOCKS: Plus Undeliv-ered Purchases	STOCKS: Total Stocks and Purchases	Unfi Orc
1950*	1,452,715	1,377,525	280,000	278,000	2,000	85,000	87,000	300
Jan.	108,921	111,668	354,487	283,119	71,368	95,890	167,258	175
Feb.	102,896	112,773	363,924	286,976	76,948	92,002	168,950	196
Mar.	106,668	123,054	381,107	293,311	87,796	79,540	167,336	200
Apr.	124,032	101,729	358,243	287,495	70,748	105,064	175,812	196
May	133,365	113,837	338,504	283,421	55,083	89,561	144,644	217
June	131,527	125,016	332,330	277,605	54,725	72,787	127,512	213
July	97,961	96,006	329,785	271,540	58,245	104,647	162,892	307
Aug.	137,518	112,107	305,174	279,823	25,351	98,324	123,675	337
Sept.	125,625	119,529	300,000	289,446	10,554	87,662	98,216	324
Oct.	128,202	121,806	292,563	289,914	2,649	90,412	93,061	308
1949	1,053,225	1,031,595	354,992	285,298	69,694	82,793	152,487	189
Jan.	109,551	94,070	364,656	295,135	69,521	82,042	151,563	300
Feb.	93,474	97,861	367,872	290,317	77,555	88,241	165,796	272
Mar.	89,834	113,154	387,871	290,565	97,306	85,945	183,251	244
Apr.	65,461	76,134	396,454	288,064	110,390	35,855	146,245	215
May	61,383	32,566	367,034	277,392	89,642	30,391	120,033	195
June	71,124	45,653	341,313	277,777	63,536	26,328	89,864	180
July	61,220	45,316	325,409	278,242	47,169	46,740	93,909	209
Aug.	88,088	90,739	328,931	286,488	42,443	50,259	92,702	188
Sept.	114,760	103,115	316,415	281,130	35,285	61,196	96,481	180
Oct.	106,928	108,192	317,829	281,924	35,905	81,322	117,227	174
Nov.	107,965	117,133	327,803	281,623	46,180	88,311	134,491	182
Dec.	83,437	107,662	354,992	285,298	69,694	82,793	152,487	189
1948	1,394,307	1,344,445	379,346	295,958	83,388	81,496	164,884	315
1947	1,338,383	1,383,666	423,432	293,859	129,573	103,765	233,338	338
1946	1,231,225	1,260,921	411,013	286,418	124,595	59,421	184,016	526
1945	1,462,440	1,517,842	375,618	268,490	107,128	44,100	151,228	362
1944	1,656,052	1,636,295	334,017	289,160	44,857	53,538	98,395	285
1943	1,701,753	1,643,955	353,948	299,796	54,152	90,807	144,959	465
1942	1,517,983	1,635,236	414,668	340,547	74,121	135,481	209,602	613
1941	1,577,765	1,545,541	295,813	291,515	4,298	241,335	245,633	547
1940	959,607	1,001,886	339,376	240,740	98,636	326,269	424,905	414
1939	793,399	814,407	300,543	184,833	115,710	189,687	305,397	237
1938	526,743	481,807	323,439	182,465	140,974	112,254	253,228	177

Nonferrous Metals

LEAD—ANTIMONY—ZINC

METALWORKING FACTS AND FIGURES

U. S. Lead

Refiners' Stocks, Production, Shipments
Net Tons

	Stock at Beginning	Production (Inc. Secondary)	Total Supply	Domestic Shipments
.....	70,424	573,000	643.424	520,000
uary	70,424	47,512	117,936	25,683
ruary	76,529	41,670	118.199	21,855
rch	79,143	49,104	128.247	22,358
il	88,581	48,196	136.777	33,751
y	86.309	48,989	135.298	45,702
e	76.236	44,490	120.726	35,774
y	69,025	41,520	110.545	41,188
gust	67,809	47,242	115.051	47,031
tember	67,495	49,958	117.453	55,898
ober	61,042	54,123	115.165	62,138
.....	38,644	542,676	581.320	355,905
.....	21,328	511,356	532.684	490,630
.....	47,587	541,065	588.652	566.666
.....	44,867	396,688	441,555	393,904
.....	19,536	524,328	543,864	500,003
.....	33,090	538,618	571,708	552,063

ican Bureau of Metal Statistics

Antimony Imports

Metal imported for consumption in United States—Net Tons

	—Antimony Ore— Gross Weight	Sb Content	Needle or Liquidated Sb	Antimony Metal	Type Metal and Antimonial Lead†
.....	17,855	7,473	81	1,853	654
.....	41.610	13,464	533	3.201	1,569
.....	28.471	9,257	17	5,879	187
.....	19.741	5,903	...	2,593	246
.....	49,385	22,643	...	627	1,380

. Department of Commerce. † Estimated antimony content.

Slab Zinc

Net Tons

(Commencing with January, 1948, all regularly operating United States primary and secondary smelters are included. Production from foreign ores is included commencing with 1940)

	Stock Beginning	Production	SHIPMENTS Domestic	Export & Drawback	Gov't. Acc't.	Total	Unfilled Orders at End
1950*	94.221	907,000	850,000	19,000	124,000	993,000	70,000
Jan.	94.221	69,948	69,020	402	12,710	82,132	52,941
Feb.	82.037	69.639	72,843	768	10,646	84,257	45,131
Mar.	67.419	77,946	74,700	627	10,262	85,589	55,433
Apr.	59.776	75,877	73,389	397	9,347	83,133	56,304
May	52.520	79,645	71,101	209	19,036	90,346	66,430
June	41.819	75,766	68,214	422	22,284	90,920	65,361
July	26.665	77,868	67,119	371	16,626	84,116	67,463
Aug.	20.417	73,399	69,073	2,893	7,399	79,365	76,847
Sept.	14.451	71,057	70,656	2,580	2,005	75,241	69,062
Oct.	10.267	79,997	71,596	4,277	5,283	81,156	64,436
Nov.	9,108	79,226	69,202	3,702	6,175	79,079	60,779
1949	20,848	870,113	648,285	56,929	91,526	796,740	42,625
1948	68.647	850,105	770,396	69.910	57,598	897,904	51,318
1947	175,800	848,027	698,281	117,305	140,230	955,816	59,705
1946	259.391	759,346	714,292	66,638	62,007	842,937	58,057
1945	237.520	799,520	762,925	9,422	5,302	777,649	27,092
1944	173.510	901,332	830,334	6,988	.....	837,322	21,332
1943	89.275	971,873	831,430	56,208	.....	887,638	44,914
1942	24,066	929,770	733,918	151,650	.....	885,568	52,752
1941	17.582	863,955	751,276	106,195	.....	857,471	87,666
1940	74,262	706,100	674,615	88,165	.....	762,780	125,132
1939	126,769	538,198	598,972	.....	.....	598,972	53,751
1938	65,333	456,990	395,534	20	.....	395,554	40,829
1937	44,955	549,619	569,241	.....	.....	569,241	48,339
1936	83,758	523,166	561,969	.....	.....	561,969	78,626
1935	118,005	431,499	465,687	59	.....	465,746	51,186
1934	105,560	366,933	352,515	148	.....	352,663	30,786
1933	124,856	324,705	343,762	239	.....	344,001	15,978
1932	129,842	213,531	218,347	170	.....	218,517	8,478
1931	143,618	300,738	314,473	41	.....	314,514	18,273
1930	75,430	504,463	436,079	196	.....	436,275	26,651

American Zinc Institute Inc. * Estimated

Antimony Production

estic mine production of ores and concentrates, Net Tons

	Gross Weight	—Antimony Content— Quantity	Average Per Cent
.....	5.260	1,636	31.1
.....	16.239	6,489	40.0
.....	20.020	5,316	26.6
.....	13.962	2,505	17.9
.....	14,966	1,930	12.9

. Bureau of Mines

Antimony Consumption

ustrial use of primary antimony—Net Tons

ODUCTS	1949	1948	1947
munition	6	21	24
monial Lead and ttery Metal	4,737	6,024	6,172
ring Metal and earings	873	1,803	2,056
le Covering	172	62	61
lings	49	81	129
apsible Tubes and Foil	14	31	77
et and Pipe	306	195	225
er	155	145	132
e Metal	587	1,019	1,216
metal Products	4,631	6,074	6,555
al	11,530	15,455	16,647

S. Bureau of Mines

Lead Die Castings

Shipments—Thousands of Pounds

	1950	1949	1948	1947
.....	659	1,019	1,303	1,195
.....	665	705	1,079	1,119
.....	847	418	1,432	1,234
.....	930	348	1,219	1,383
.....	982	476	1,260	966
e	1,094	606	1,183	1,079
.....	1,045	600	861	1,013
.....	1,629	979	1,120	1,000
.....	1,479	1,319	1,420	1,241
.....	.....	1,278	1,366	1,393
.....	.....	800	1,152	1,205
.....	.....	553	1,432	1,308
otal		9,101	14,877	14,136

S. Bureau of the Census

Mine Production of Zinc

Net Tons

	1950	1949	1948	1947	1946
Jan.....	43.793	51,656	48,068	55.036	51,870
Feb. ...	46.187	52,963	48.241	51.770	47,968
Mar....	51.212	62.049	54,989	55.874	51.177
Apr. ...	49,113	59,185	53.425	58,447	47.972
May ...	51.785	55,925	51.927	59.098	48,655
June...	50.184	54.271	51.755	62.121	42,966
July ...	48.372	40.256	47.095	47.719	33.737
Aug....	56.114	45,068	49.748	48.855	46.567
Sept....	54,572	41,887	52.581	47.608	49.030
Oct.	54,728	38.823	53.542	51.506	52.191
Nov. ...	.....	40.112	55.005	48.976	50.574
Dec. ...	.....	41,687	55,141	50.598	52,126
Mo.Avg.		48,657	52,498	53,134	47,903

U. S. Bureau of Mines

Zinc and Zinc Alloy Castings

Shipments—Thousands of Pounds

	1950	1949	1948	1947
Jan.	37,177	32,366	36,149	37,218
Feb.	33.397	28,411	37,642	38,344
Mar.	43.094	29,400	41,521	41,343
Apr.	40.400	27,654	39.070	40,855
May	47,454	28,397	35,469	36,772
June	48,818	32,356	37,136	33,890
July	42,188	25,674	32,459	31,313
Aug.	47,212	35,227	37,519	28,137
Sept.	49,079	35,792	36,720	32,727
Oct.	.....	36,183	38,407	38,612
Nov.	.....	31,028	35,931	33,617
Dec.	.....	34,134	36,891	37,218
Total	.....	376,730	444,954	430,046

U. S. Bureau of the Census

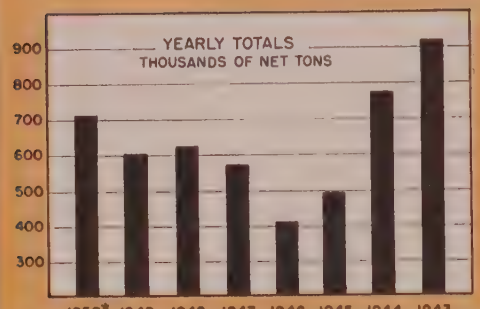
CONSUMPTION OF LEAD IN U.S.—1950

Net Tons

Metal Products:	Total 1949	1950 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Ammunition	24,110	1,379	1,745	2.545	2,204	2,264	2,744	2,673	3.530
Bearing Metals	28,536	2,162	2,010	2,475	2,210	2,774	2,869	2,795	3,687
Brass & Bronze.....	13,807	1,257	1,183	1,426	1,396	1,567	1,517	1,272	1,866
Cable Covering.....	125,406	10,336	8,894	11,993	10,209	11,313	10,628	6,930	13,343
Calking Lead	31,355	2,853	2,307	3,184	3,429	4,348	3,901	4,771	5,981
Casting Metals.....	11,804	776	787	1,142	1,048	1,526	1,340	1,149	1,905
Collapsible Tubes	8,672	907	810	856	789	742	948	801	1,175
Foil	2,503	68	196	146	264	262	321	238	311
Pipes, Traps & Bends	29,410	3.012	2,219	2,835	2,806	3,478	3,894	3,819	4,321
Sheet Lead	26,257	2,135	2,039	2,032	2,215	2,681	2,837	3,486	3,448
Solder	61,126	5,397	5,178	6,232	5,723	6,775	7,912	8,080	10,382
Storage Batteries									
Antimonial Lead....	151,676	12,899	12,453	13,154	12,023	15,460	17,047	17,207	22,785
Oxides	117,213	10,315	9,550	9,727	10,016	13,746	14,609	14,572	17,382
Terne Metal	2,823	232	121	221	114	265	300	668	342
Type Metal	20,651	1,202	1,454	1,362	1,291	1,563	1,786	1,665	3,986
Total Metal Products...	655,349	54,930	50,946	59,330	55,767	68,764	72,653	70,126	94,424
Pigments	101,016	10,681	9,336	10,364	10,218	12,114	13,135	11,362	18,269
Chemicals	98,835	8,797	8,627	9,799	9,666	10,151	9,155	9,823	10,840
Miscellaneous Uses	20,170	1,929	1,610	2,104	1,796	2,131	1,909	1,989	2,502
Total consumed	875,370	76,337	70,519	81,597	77,447	93,160	96,852	93,300	126,035

U. S. Bureau of Mines * Estimated

PRIMARY ALUMINUM PRODUCTION



1950-1944 By Months—Net Tons

	1950	1949	1948	1947	1946	1945	1944
Jan.	52,023	53,356	48,767	50,045	24,750	48,650	84,750
Feb.	50,668	49,749	45,899	47,002	22,250	45,650	74,400
Mar.	58,747	54,852	51,874	53,032	26,000	53,100	80,200
Apr.	58,024	54,076	53,277	51,007	25,900	51,600	77,800
May	61,929	56,909	55,450	51,116	24,850	52,000	76,450
June	60,400	54,184	48,557	46,259	27,800	47,500	66,400
July	63,518	55,777	52,937	47,998	35,750	47,900	67,550
Aug.	63,006	52,001	54,953	47,054	39,850	45,800	61,650
Sept.	59,450	49,742	53,255	43,228	41,100	31,600	47,450
Oct.	.....	45,790	54,526	43,959	45,000	25,000	48,400
Nov.	.....	35,865	50,714	43,461	46,300	20,800	44,450
Dec.	.....	41,161	53,474	47,589	50,700	24,000	46,850
Total	710,000*	603,462	623,456	571,750	409,630	495,080	776,446

Yearly totals reflect adjustments and in some instances vary slightly from the sums of monthly figures. U. S. Bureau of Mines.

Secondary Aluminum Production

Net Tons

	From New Scrap	From Old Scrap	As Metal	From Alloys, Scrap	Total
1949	136,166	44,596	343	180,419	180,762
1948	191,129	95,648	2,384	284,393	286,777
1947	180,990	163,847	5,105	339,732	344,837
1946	187,538	90,535	2,075	275,998	278,073
1945	271,076	27,311	2,145	296,242	298,387
1944	302,746	22,899	2,336	323,309	325,645
1943	280,867	33,094	5,926	308,035	313,961
1942	154,831	41,633	14,104	184,388	198,492
1941	63,744	43,113	8,308	98,549	106,857
1939	16,184	37,763	2,900	51,047	53,947

U. S. Bureau of Mines

Bauxite Production and Imports

Long Tons—Quarterly figures are preliminary and their sums differ slightly from final annual totals.

	—Mine Production (dried equiv.)— Arkansas	Ala., Ga., Va.	Total	Imports as Shipped	Total New Supply
1950					
1st Qtr.	N.A.	N.A.	325,025	628,318	953,343
2nd Qtr.	N.A.	N.A.	359,938	640,896	1,000,834
1949	1,094,924	53,868	1,148,792	2,688,164	3,836,956
1st Qtr.	303,048	14,690	317,738	602,134	919,872
2nd Qtr.	279,051	12,553	291,604	625,772	917,376
3rd Qtr.	194,066	12,441	206,507	704,876	911,383
4th Qtr.	305,943	17,323	323,266	755,382	1,078,648
1948	1,395,341	61,807	1,457,148	2,488,915	3,946,063
1st Qtr.	290,799	13,377	304,176	589,215	893,391
2nd Qtr.	348,143	19,830	367,973	604,337	972,310
3rd Qtr.	429,558	16,588	446,146	618,092	1,064,238
4th Qtr.	360,068	13,540	373,608	677,271	1,050,879
1947	1,153,563	48,492	1,202,055	1,821,580	3,023,635
1946	1,019,118	53,707	1,072,825	852,005	1,924,830
1945	910,049	70,960	981,009	739,581	1,720,590
1944	2,695,317	128,407	2,823,724	560,461	3,384,185
1943	6,036,490	196,393	6,232,883	1,547,854	7,780,737

† Includes Mississippi; N.A.—Not available. U. S. Bureau of Mines.

Aluminum Wrought Products

Producers' Shipments, Thousands of Pounds

Period	Total	Plate, Sheet, and Strip	Rolled Structural Shapes, Rod, Bar, Wire	Extruded Shapes, Tube Blooms, and Tubing	Powder Flake, and Paste
1950*	1,700,000	1,150,000	268,000	260,000	22,000
January	100,727	68,525	15,359	15,686	1,157
February	111,293	77,016	17,529	15,513	1,235
March	149,081	107,367	20,972	19,523	1,169
April	129,393	89,406	20,002	18,494	1,491
May	127,531	85,683	20,133	20,255	1,460
June	137,523	92,694	20,995	22,081	1,753
July	133,600	90,300	20,885	20,176	2,239
August	169,062	112,966	27,850	25,244	3,002
September	165,851	110,163	28,032	25,600	2,056
1949	1,158,146	790,025	203,650	149,995	14,476
January	119,285	90,165	13,375	14,237	1,508
February	110,034	80,699	14,607	13,828	900
March	125,428	92,435	16,103	15,745	1,145
April	105,735	73,066	18,075	13,692	902
May	89,041	56,886	19,111	12,055	1,009
June	80,674	48,074	20,176	11,246	1,178
July	71,730	42,822	18,122	9,525	1,261
August	80,196	49,339	19,678	9,805	1,374
September	95,987	65,347	18,634	10,516	1,490
October	106,233	75,918	16,772	11,846	1,697
November	80,742	54,054	12,705	13,056	927
December	93,061	61,240	16,292	14,444	1,085
1948	1,640,186	1,268,297	182,991	171,944	16,954
January	139,588	109,743	15,948	12,565	1,332
February	135,955	105,739	14,755	14,323	1,108
March	159,109	126,675	15,280	16,032	1,122
April	138,967	106,746	15,059	16,110	1,052
May	133,285	101,879	14,812	15,566	1,028
June	141,799	106,924	16,366	16,850	1,659
July	131,028	99,437	15,259	14,833	1,499
August	135,196	103,186	15,601	14,552	1,857
September	131,003	104,609	13,542	11,224	1,628
October	138,632	109,669	15,292	12,159	1,512
November	129,754	99,200	15,426	13,682	1,446
December	125,870	94,490	15,621	14,048	1,711
1947	1,408,152	1,111,159	157,379	123,048	16,566

U. S. Bureau of the Census

Aluminum and Aluminum-base Alloy Castings

Shipments—Thousands of Pounds

	1950	1949	1948	1947
Jan.	28,801	29,142	37,889	40,689
Feb.	28,887	27,228	37,963	37,767
Mar.	35,845	27,478	41,794	42,266
Apr.	33,556	23,801	38,269	41,669
May	36,031	21,382	33,868	37,400
June	37,690	23,245	35,822	32,986
July	30,752	18,608	28,944	30,197
Aug.	39,852	23,986	32,136	30,441
Sept.	42,061	27,525	35,877	35,877
Oct.	.....	29,108	35,542	40,532
Nov.	.....	26,317	34,550	34,683
Dec.	.....	26,762	31,836	37,489

YEARLY SHIPMENTS

1949	304,518	1946	388,711
1948	424,490	1945	395,007
1947	441,996	1944	514,400

U. S. Bureau of the Census

Magnesium Wrought Products

Shipments—Thousands of Pounds

	1950	1949	1948	1947	1946
Jan.	952	581	314	700	427
Feb.	761	636	413	752	415
Mar.	868	672	460	588	466
Apr.	998	537	516	449	483
May	850	756	448	420	448
June	1,198	752	526	290	554
July	1,177	748	205	285	571
Aug	1,103	671	497	253	507
Sept.	1,011	724	707	247	656
Oct.	...	793	519	299	715
Nov.	...	622	532	269	764
Dec.	...	772	728	275	636
Year	...	8,264	5,865	4,807	6,642

U. S. Bureau of Mines

Magnesium and Magnesium-base Alloy Castings

Shipments—Thousands of Pounds

	1950	1949	1948	1947	19
Jan.	814	822	659	864	4
Feb.	735	813	655	768	4
Mar.	903	879	704	717	6
Apr.	799	726	673	684	6
May	810	778	622	628	6
June	758	799	709	613	7
July	727	689	554	709	6
Aug.	1,147	753	703	523	7
Sept.	1,231	727	745	518	8
Oct.	...	796	708	616	9
Nov.	...	801	728	602	7
Dec.	...	781	754	669	7

YEARLY SHIPMENTS

1949	9,364	1946	8,4
1948	8,214	1945	83,7
1947	7,691	1944	201,4

U. S. Bureau of the Census

Nonferrous Metals

TIN—MOLYBDENUM—MANGANESE—TUNGSTEN—SILVER

METALWORKING FACTS AND FIGURES

. S. Tin Imports

(Tin Content), and Metal
s, Blocks, Pigs, etc.) in Long

	Ore	Metal
n.	2,549	7,409
b.	1,383	8,184
r.	1,755	4,972
r.	1,392	2,941
y	374	10,434
ne	473	8,569
ly	658	11,821
n.	3,977	587
b.	2,443	2,526
ar.	3,174	8,795
r.	4,205	8,493
y	3,801	4,210
ne	2,108	4,049
ly	2,210	3,318
g.	2,332	6,434
pt.	3,284	6,458
.....	4,899	7,558
v.	4,122	4,881
c.	1,793	2,915
MONTHLY AVERAGES		
.....	3,196	5,019
.....	3,085	4,100
.....	2,543	2,075
.....	3,173	1,293
.....	2,794	708
.....	2,962	1,112
.....	1,822	993
.....	2,411	2,229
.....	2,389	11,739
.....	42	5,842

ce of Domestic Commerce

ilver Production

ousands of ounces; commercial
., 0.999 fine, and other refined
ns.)

	Domestic†	Foreign	Total
)*	44,000	34,000	78,000
n.	2,965	2,049	5,014
eb.	2,496	1,935	4,431
lar.	3,721	3,718	7,439
pr.	4,224	3,661	7,885
lay	3,890	3,652	7,542
ne	2,669	3,374	6,043
uly	4,102	2,232	6,334
ug.	3,660	3,792	7,452
ept.	4,222	2,413	6,635
.....	34,559	28,226	62,785
an.	2,761	2,891	5,652
eb.	2,821	1,846	4,667
lar.	2,743	3,273	6,016
pr.	3,341	1,569	4,910
lay	3,614	2,454	6,068
une	2,676	1,906	4,582
uly	2,349	2,185	4,534
ug.	2,909	2,649	5,558
ept.	2,167	2,925	5,092
ct.	2,884	1,982	4,866
ov.	3,101	2,800	5,901
ec.	3,193	1,746	4,939
8	36,111	37,680	73,791
7	36,053	39,645	75,698
6	21,377	30,371	51,748
5	29,332	38,786	68,118
4	37,370	39,341	76,711
3	44,812	51,295	96,107

ncludes purchases of crude silver
the United States Mint.
merican Bureau of Metal Statis-
s.

U. S. Tin Consumption and Stocks

Long Tons

	Consumption: Primary	Consumption: Secondary	Consumption: Total	Stocks
1950*	70,000	25,000	95,000	60,000
Jan.	4,953	1,918	6,811	65,804
Feb.	4,951	1,880	6,831	71,832
Mar.	5,646	2,222	7,868	67,889
Apr.	5,579	1,855	7,434	67,652
May	5,958	2,253	8,211	67,125
June	6,511	2,169	8,680	63,801
1949	50,120	21,209	71,329	59,813
1948	59,863	30,925	90,788	63,517
1947	59,166	28,934	88,100	68,728
1946	54,627	26,316	80,943	60,585
1945	55,642	27,941	83,583	71,408
1944	59,156	30,813	89,969	89,914
1943	46,253	34,077	80,330	105,784
1942	56,288	29,399	85,687	127,797
1941	103,086	31,609	134,695	146,888
1940	72,824	24,830	97,154	92,770
1939	66,583	15,845	82,428	37,076
1938	48,116	11,658	59,774	27,158

International Tin Study Group

Nickel Production

Net Tons

	Canada	Other Countries	Estimated Total
1950* ...	135,000	35,000	170,000
1949* ...	132,000	34,000	166,000
1948	131,075	33,925	165,000
1947	118,627	34,373	153,000
1946	96,062	39,938	136,000
1945	122,565	37,435	160,000
1944	137,299	35,701	173,000
1943	144,009	40,091	184,100
1942	142,606	31,594	174,200
1941	141,129	37,471	178,600
1940	122,779	31,521	154,300
1939	113,053	21,447	134,500
1938	105,286	22,014	127,300
1937	112,453	19,947	132,400
1936	84,870	18,080	102,950
1935	69,258	16,042	85,300
1934	64,344	14,556	78,900
1933	41,632	9,368	51,000

U. S. Bureau of Mines; Dominion Bureau of Statistics; STEEL

Tungsten

U. S. Mines—Pounds

	Production	Shipments
1950*	3,900,000	4,000,000
1st Qtr.	848,617	1,084,961
2nd Qtr.	1,054,823	1,057,995
1949	2,806,084	2,631,506
1948	4,006,741	3,811,639
1947	3,026,470	2,944,622
1946	4,671,042	4,942,282
1945	5,388,639	5,266,818
1944	9,764,647	9,786,537

U. S. Bureau of Mines

U. S. Tin Smelter Output

Long Tons

	1950	1949	1948	1947	1946
Jan. ...	2,627	3,257	3,172	3,024	3,812
Feb. ...	2,362	3,254	2,800	2,815	3,823
Mar. ...	2,729	3,104	2,602	2,877	3,881
Apr. ...	2,484	2,851	2,906	2,816	3,891
May ...	2,852	3,007	3,310	3,112	3,904
June ...	2,204	3,006	3,650	2,712	3,856
July ...	2,256	2,910	3,509	2,517	3,853
Aug. ...	2,396	3,005	3,509	2,237	3,672
Sept. ...	2,805	2,910	2,859	2,356	3,323
Oct. ...	3,209	2,964	2,300	3,026	3,125
Nov. ...	3,000*	2,994	2,907	2,759	3,119
Dec. ...	3,000*	2,791	3,153	3,041	3,209
Total ..31,924		36,053	36,677	33,292	43,468

Office of Domestic Commerce

World Tin

Long Tons

	Production	Consumption	Stocks
1950*	172,000	142,000	110,000
Jan.	13,800	10,800	127,500
Feb.	12,000	10,700	132,900
Mar.	15,200	11,800	129,900
Apr.	14,200	12,100	126,200
May	16,000	12,000	126,900
June	15,200	12,800	118,500
July	13,500	.....	.....
Aug.	14,700	.....	.....
1949	168,600	118,900	129,300
1948	157,400	135,700	134,000
1947	124,600	131,000	141,100
1946	99,300	111,700	153,600
1945	89,400	103,000	170,900
1944	98,700	102,500	156,500
1943	108,500	97,500	166,100
1942	101,500	118,000	171,900
1941	215,000	173,000	192,200
1939	170,500	154,000	74,700

International Tin Study Group. Figures are partly estimated and include substantial revisions from previously reported totals. Stocks do not include those of consumers.

Molybdenum Products

Comprises ferromolybdenum, molybdic oxide, and molybdenum salts and metal

Pounds

	Production	Shipments†	Stocks
1950*	22,000,000	24,000,000	8,850,000
1st 6 mos.	10,926,500	12,078,600	9,685,800
1st Qtr..	5,507,900	5,895,100	10,650,700
2nd Qtr..	5,418,600	6,383,500	9,685,800
1949‡	19,624,200	16,333,100	10,837,900
1st Qtr..	6,397,400	5,220,900	8,714,300
2nd Qtr..	5,421,700	3,329,700	10,806,300
3rd Qtr..	4,146,000	3,589,100	11,363,200
4th Qtr..	3,592,800	4,159,200	10,796,800
1948	24,445,300	25,024,700	7,546,800
1st Qtr..	4,921,700	5,616,100	7,431,800
2nd Qtr..	5,819,400	5,875,400	7,375,800
3rd Qtr..	6,526,300	5,591,000	8,311,100
4th Qtr..	7,332,200	8,090,200	7,553,100
1947	20,659,700	20,744,900	8,126,200
1946	15,039,100	16,944,100	8,211,400

† Including exports. ‡ Revised.
U. S. Bureau of Mines

Manganese

(Supplies for United States Consumption, net tons.)

	Domestic Mine Shipments	General Imports: Ore	General Imports: Ferro-manganese†	Exports: Ore	Exports: Ferro-manganese†	Net Supply
0*	153,800	1,800,000	200,000	7,000	1,200	2,145,600
st Qtr. .	27,100	391,886	26,188	1,129	692	443,353
nd Qtr. .	38,800	496,940	60,184	1,884	122	593,918
rd Qtr. .	43,900	464,819	73,016	2,058	254	579,426
9	126,100	1,544,526	130,028	5,033	13,254	1,782,387
st Qtr. .	13,700	273,666	64,725	1,478	7,251	343,362
nd Qtr. .	31,600	335,865	53,036	1,026	1,990	417,485
rd Qtr. .	40,722	424,637	1,660	1,153	1,452	464,414
th Qtr. .	40,078	510,358	10,607	1,376	2,561	557,108
8	131,100	1,256,597	195,360	9,236	39,175	1,534,646
7	131,627	1,541,818	156,760	10,075	38,884	1,781,246
6	143,635	1,749,223	61,947	19,137	5,690	1,929,978

*Expressed in terms of ore

U. S. Bureau of Mines

Molybdenum Concentrates

Pounds

	Production	Shipments†	Consumption	Stocks
1950*	23,500,000	28,000,000	22,500,000	16,000,000
1st 6 mos.	11,972,100	14,637,800	11,124,900	16,737,400
1st Qtr. .	5,813,300	7,595,000	5,548,500	17,628,300
2nd Qtr. .	6,158,800	7,042,800	5,576,400	16,737,400
1949	22,529,800	23,280,400	19,960,000	19,159,100
1st Qtr.	5,270,700	6,371,400	6,363,200	19,220,600
2nd Qtr. .	5,813,300	7,783,800	5,557,800	17,963,300
3rd Qtr. .	6,035,400	5,125,600	4,280,800	17,913,200
4th Qtr.	5,110,400	3,999,600	3,758,200	19,159,100
1948	26,706,000	29,669,000	25,156,000	21,205,800
1947	27,047,000	22,189,800	20,221,000	23,660,500

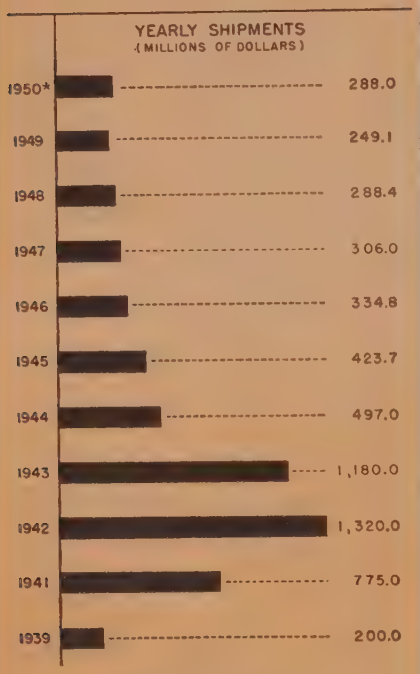
† Including exports, plus concentrates converted to oxide at Miami, Ariz., and Langeloth, Pa. ‡ Revised.
U. S. Bureau of Mines

* Estimated

Machinery & Equipment

METALWORKING FACTS AND FIGURES

MACHINE TOOLS



1950-1949 Indexes

(1945-1947 Shipments = 100)

	—Indexes of Orders— Total		Domestic		Indexes of Shipments	
	1950	1949	1950	1949	1950	1949
Jan.	99.7	87.0	73.0	65.1	52.8	68.8
Feb.	89.2	80.9	70.4	54.4	56.1	70.3
Mar.	107.4	93.5	82.5	71.2	75.3	75.8
Apr.	98.9	70.1	81.5	47.0	61.6	74.7
May	116.4	63.7	98.0	47.9	82.5	72.8
June	124.1	53.6	101.1	37.9	91.9	79.0
July	253.1	48.0	230.8	34.0	68.3	60.7
Aug.	305.1	51.5	270.9	32.7	95.7	67.3
Sept.	280.6	57.7	253.4	44.0	101.6	67.6
Oct.	289.6	56.8	240.1	43.1	100.9	62.3
Nov.	292.7	84.3	266.1	67.3	110.9	67.6
Dec.	...	82.5	...	60.1	...	75.7

National Machine Tool Builders' Association

Farm Machinery, Equipment

Manufacturers' Shipments of Complete Units, Attachments and Parts

	Domestic	Export
1949	$1,552,410,000	$262,380,000
1948	1,513,613,000	220,133,000
1947	1,132,685,460	162,000,391
1946	763,230,488	87,247,115
1945	612,595,399	87,581,956
1944	549,310,771	68,069,766
1943	301,581,890	42,059,120

YEARLY TOTALS

1949.	$1,814,790,000	1946.	$850,477,603
1948.	1,733,746,000	1945.	700,177,355
1947.	1,294,685,851	1944.	617,380,537

U. S. Bureau of the Census

Earthmoving, Excavating Equipment

Manufacturers' Shipments
(Values in Thousands of Dollars)

	Power Cranes and Shovels —1950— Units	Value	—1949— Units	Value
1st	1,094	$23,287	1,394	$31,133
2nd	1,294	26,232	1,045	22,464
3rd	1,303	27,238	850	17,806
4th	....	.....	825	17,801
Total	....	.....	4,114	$89,204
Road Construction and Maintenance Machinery				
1st	....	$22,794	....	$28,395
2nd	....	31,024	....	25,880
3rd	....	32,374	....	21,747
4th	....	.....	....	20,794
Total	....	.....	....	$96,816
Construction Machinery for Mounting on Tractors				
1st	....	$10,970	....	$10,535
2nd	....	14,664	....	10,260
3rd	....	17,149	....	8,220
4th	....	.....	....	9,162
Total	....	.....	....	$38,177
TrackLaying Tractors				
1st	11,798	$54,821	10,913	$50,947
2nd	13,247	64,090	12,526	55,630
3rd	9,838	53,135	10,162	47,172
4th	....	.....	9,148	42,873
Total	....	.....	42,749	$196,622
Wheel-type Heavy Duty Industrial Tractors				
1st	296	$3,296	295	$3,430
2nd	547	6,246	346	4,127
3rd	639	7,707	232	2,748
4th	...	....	174	2,194
Total	...	....	1,047	$12,499
Portable Well and Blast Hole Drills				
1st	176	$1,285	190	$1,666
2nd	126	643	235	1,954
3rd	105	800	182	1,542
4th	...	....	200	1,612
Total	...	....	807	$6,774

U. S. Bureau of the Census

Tractors

Manufacturers' Shipments

Year	Number	Value
Wheel Type—For Farm Use		
1949	538,651	$545,465,116
1948	510,847	468,083,292
1947	413,783	331,652,526
1946	243,271	180,362,770
1945	224,985	153,170,092
1944	235,453	157,518,924
Wheel Type—For Non-Farm Use		
1949	9,554	$17,819,864
1948	18,845	29,215,151
1947	14,882	17,681,997
1946	12,067	11,909,354
1945	18,707	15,725,730
1944	14,502	12,593,984
Trackloying Type—For Farm Use		
1949	20,043	$64,481,439
1948	17,365	49,569,066
1947	11,630	28,332,491
1946	8,898	18,117,637
1945	11,149	20,973,907
1944	6,221	10,414,553
Trackloying Type—For Non-Farm Use		
1949	23,806	$134,941,835
1948	22,208	112,437,953
1947	25,904	105,997,470
1946	17,367	64,816,042
1945	32,849	191,033,573
1944	38,966	250,168,422

U. S. Bureau of the Census

Electric Industrial Trucks and Tractors

Shipments

	Domestic 1950	1949	Export 1950	1949	Total 1950	1949
Jan.	180	184	19	20	199	204
Feb.	146	255	37	15	183	270
Mar.	196	214	33	33	229	247
Apr.	172	142	32	57	204	199
May	183	179	20	29	203	208
June	238	175	30	30	268	205
July	177	133	22	35	199	168
Aug.	216	183	21	19	237	202
Sept.	234	168	29	17	263	185
Oct.	255	235	35	19	290	254
Nov.	...	197	..	30	...	227
Dec.	...	186	..	46	...	232
Total	2,251		350		2,601	

YEARLY TOTALS

	Domestic	Export	Total
1949	2,251	350	2,601
1948	2,904	543	3,447
1947	3,565	566	4,131
1946	2,714	160	2,874
1945	3,627	224	3,851
1944	4,380	395	4,775
1943	4,280	211	4,491
1942	4,365	207	4,572
1941	2,837	254	3,091

U. S. Bureau of the Census

Foundry Equipment Shipments

(Dollar Volume)

	—NEW EQUIPMENT— 1950	1949	—REPAIRS— 1950	1949
Jan.	735,171	1,213,737	508,831	816,018
Feb.	583,793	1,387,142	523,501	823,916
Mar.	906,870	955,240	671,463	767,386
Apr.	613,156	998,808	577,569	716,807
May	789,996	950,194	668,547	578,681
June	943,249	1,136,552	739,158	578,198
July	841,733	1,027,326	773,522	419,055
Aug.	782,165	1,057,651	751,158	509,963
Sept.	839,508	770,185	725,939	574,653
Oct.	1,448,630	979,891	934,456	567,492
Nov.	.....	814,423	.....	534,669
Dec.	.....	782,906	.....	514,488
Total	.....	12,074,055	.....	7,401,326

Foundry Equip. Mfrs. Assn.

Orders Placed for New Foundry Equipment

Indexes based on 1937-38-39 monthly average as 100%

	—1950— Dollars	Index	—1949— Dollars	Index	1948 Index	1947 Index
Jan.	730,769	159.3	693,747	149.9	380.9	466.9
Feb.	519,111	113.1	668,095	144.4	367.3	472.5
Mar.	1,033,585	225.2	882,645	190.8	326.2	532.3
Apr.	737,119	160.6	797,085	172.0	412.0	445.9
May	1,353,284	294.9	564,814	121.9	388.5	525.9
June	2,857,514	622.7	763,920	164.9	376.8	658.9
July	1,843,821	401.8	679,432	146.6	456.3	426.1
Aug.	3,182,714	693.6	588,975	127.1	324.7	411.3
Sept.	2,220,140	483.8	771,864	166.6	273.5	393.1
Oct.	2,417,290	526.8	618,489	133.5	296.0	438.2
Nov.	....	....	1,250,059	270.4	284.4	286.1
Dec.	.....	....	929,343	201.0	243.7	467.8
Total	.....		9,208,468			

* Estimated

WELDING ELECTRODES SHIPMENTS

(Shipments in Pounds)

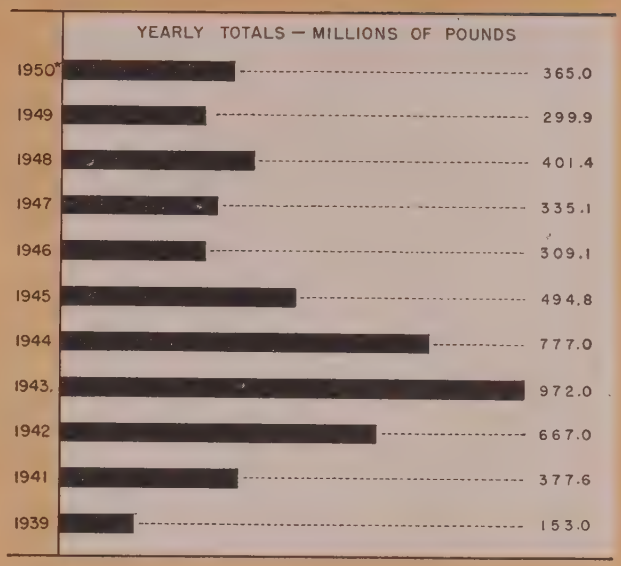
	Mild Steel	Alloy	Nonferrous	Total
J uary	22,175,826	2,786,958	147,971	25,110,755
F ruary	22,553,147	2,544,903	127,476	25,225,526
M rch	25,543,718	3,051,465	167,818	28,763,001
A il	22,187,164	2,386,890	118,347	24,692,401
M y	26,947,144	3,076,530	183,468	30,207,142
J e	28,084,344	3,458,974	167,448	31,710,766
J y	24,296,248	2,989,268	149,576	27,435,092
A gust	25,309,631	3,383,291	149,888	28,842,810
S tember	28,173,221	3,155,980	180,122	31,509,323
O ober	34,728,145	3,791,334	150,442	38,669,921
N vember	.....	.....	.....	.....
D cember	.....	.....	.....	.....

Yearly Totals

	Mild Steel	Alloy	Nonferrous	Total
1 0*	.....	.....	.....	365,000,000
1 9	273,463,740	24,753,807	1,715,362	299,932,909
1 8	369,019,831	30,214,928	2,124,496	401,359,255
1 7	307,756,495	25,172,382	2,149,768	335,078,645
1 6	284,126,356	24,991,208†	.....	309,117,564
1 5	435,789,217	59,029,938†	.....	494,819,155
1 4	707,756,964	69,236,137†	.....	776,993,101
1 3	.....	.....	.....	971,929,782
1 2	.....	.....	.....	666,965,595
1 1	.....	.....	.....	377,564,483
1 0	.....	.....	.....	152,863,373

*Estimated. †Includes both alloy and nonferrous electrodes.

National Electrical Mfrs. Assn.



Farm Pumps

Factory Shipments

JET PUMP SYSTEMS

	Units	Value
J -June	190,756	$16,035,000
J	42,782	3,646,000
A gust	45,964	4,029,000
S tember	46,968	4,181,000
O ober	47,429	4,291,000
Yearly Totals		
1 9	293,709	$24,383,966
1 8	329,022	27,518,184
1 7	361,140	29,694,040
1 6	318,758	24,134,614
1 5	175,652	12,475,083

NON-JET PUMP SYSTEMS

	Units	Value
J -June	125,767	$9,400,000
J	23,969	1,827,000
A gust	30,282	2,347,000
S tember	26,673	2,110,000
O ober	26,275	2,087,000
Yearly Totals		
1 9	234,255	$17,492,313
1 8	329,825	23,653,435
1 7	401,715	26,122,759
1 6	306,971	16,639,422
1 5	214,478	11,082,266

U. S. Bureau of the Census

Motors and Generators

New Orders—Thousands of Dollars

	Polyphase Induc. Motors, 1-200 hp		DC Generators & Motors, 1-200 hp	
.	1950	1949	1950	1949
....	28,236	21,148	4,692	5,266
....	25,436	18,679	6,106	4,997
....	46,582	17,715	7,428	2,890
....	.....	18,521	....	3,747
otal		76,063	....	16,900

YEARLY TOTALS

Polyphase Induc. Motors, 1-200 hp		DC Generators & Motors, 1-200 hp	
9 76,063	1949	16,900	
8 95,577	1948	22,273	
7 122,043	1947	20,381	
6 142,464	1946	20,942	
5 87,621	1945	37,194	
4 68,555	1944	74,581	
3 84,862	1943	83,494	
2 114,650	1942	94,693	
1 78,357	1941	38,723	

National Electrical Mfrs. Assn.

Pumps

(Steam, power, centrifugal, rotary)
New Orders—Thousands of Dollars

	1950	1949	1948	1947	1946
Jan. ..	2,587	3.390	3,819	3,428	2,836
Feb. ..	2,938	3,247	3,635	3,506	2,728
Mar. ..	3,313	3.593	4,703	3,464	2,489
Apr. ..	3,376	2,699	4,312	3,638	2,803
May ..	3,668	2.775	3,724	2.973	2,856
June ..	4,153	3.019	3.512	2.999	2,648
July ..	4,080	3.358	4.075	3.148	4.014
Aug. ..	6,429	3.767	4.520	3.843	3.789
Sept. ..	5,191	2.914	3.474	3.355	3,223
Oct. ..	4,985	2,539	3.571	3,475	3,581
Nov. ..	....	2,525	3.580	2,673	3,260
Dec. ..	....	2,560	4,263	3,480	3,035
Total.		36,386	47,188	39,982	37,262

MONTHLY AVERAGES

1950*	4,060	1944	3,436
1949	3,032	1943	6.214
1948	3,932	1942	6.155
1947	3,332	1941	3,606
1946	3,105	1940	2,204
1945	2,869	1939	1,352

Hydraulic Institute * Estimated

Unit Heaters

Shipments—Thousands of Dollars

Qtrs.	1950	1949	1948
1st	7,482	8,318	10,127
2nd	7,927	6.133	6,827
3rd	12,858	9.304	9,544
4th	....	13,341	12,936

YEARLY TOTALS

1949 ..... 37,096 1948 39,434

U. S. Bureau of the Census

Gear Sales

Indexes of New Orders Placed
Average Month 1935-1939=100

	1950	1949	1948	1947
Jan.	280.2	320.7	346.8	317.0
Feb.	272.9	282.3	324.4	303.0
Mar. ...	358.4	299.1	389.8	342.9
Apr. ...	328.6	339.0	320.9	346.2
May	363.1	250.1	283.6	317.2
June ...	401.0	227.8	324.1	278.0
July	410.7	193.1	348.4	278.5
Aug. ...	617.4	262 0	335.6	261.6
Sept. ...	654.5	224.9	320.4	297.7
Oct.	564.8	242.3	333.3	317.7
Nov. ...	....	230 7	309.0	356.9
Dec.	....	242.8	325.9	343.6

American Gear Mfrs. Assn.

Industrial Furnaces, Electric

New Orders

1950	Units	Kilowatts	Value
January	365	4,353	$473,238
February	383	7,175	697,232
March	415	5,226	753,448
April	289	3,619	414,801
May	405	7,514	981,502
June	637	9,356	1,327,580
July	533	9,114	1,444,519
August	506	7,245	1,038,631
September ...	557	21,213	1,485,237
October	612	13,078	1,602,878
November ...	...	.....	.....
December ...	...	.....	.....

YEARLY TOTALS

1949	4,664	48,525	$5,284,021
1948	3,942	55,068	5,836,410

Industrial Furnace Mfrs. Assn. Inc.

Industrial Furnaces, Fuel Fired

(Except for hot rolling steel mills)
New Orders—Thousands of Dollars

1950	Value	1950	Value
January	1,914	July	2,247
February ...	616	August	3,927
March	1,300	September ..	1,817
April	837	October	2,300
May	1,392	November ..	....
June	1,166	December ..	....

YEARLY TOTALS

1949 ..... 6,391 1948 10,599

Industrial Furnace Mfrs. Assn. Inc.

Blowers and Fans

Shipments—Thousands of Dollars

Qtrs.	1950	1949	1948
1st	17,631	16.801	14,852
2nd	25,893	21,098	16,799
3rd	22,348	19,340	15,490
4th	.....	15,251	17,354

YEARLY TOTALS

1949 ..... 72,490 1948 64,495

U. S. Bureau of the Census

Transportation

METALWORKING FACTS AND FIGURES

AUTOMOBILE PRODUCTION UNITED STATES AND CANADA

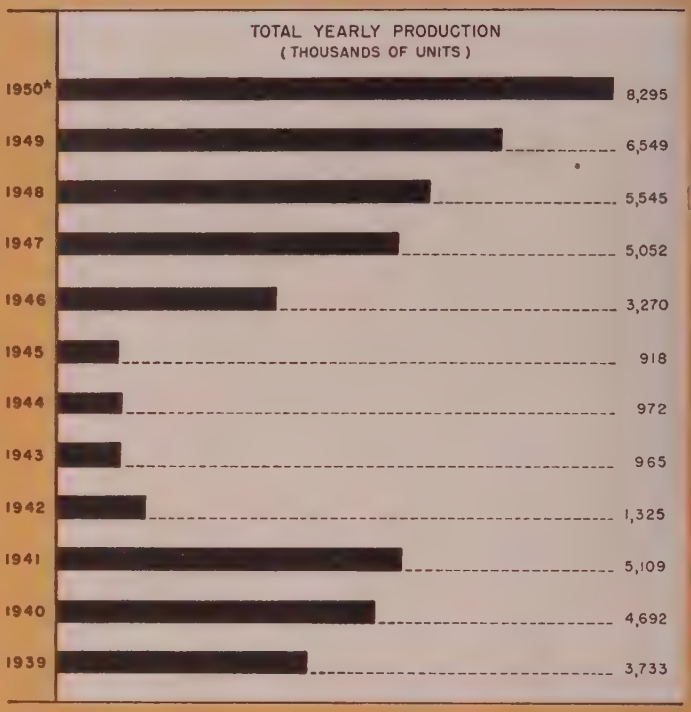
1950	Passenger Cars	Trucks	Total
Jan.	518,024	104,743	622,767
Feb.	403,721	98,693	502,414
Mar.	490,776	118,446	609,222
Apr.	473,886	111,008	584,894
May	602,515	133,105	735,620
June	749,993	147,315	897,308
July	627,941	121,753	749,694
Aug.	703,012	143,589	846,601
Sept.	638,509	112,883	751,392
Oct.	681,290	119,708	800,998
Nov.	528,550	104,447	632,997
Dec.	.....	.....	.....

1949	Passenger Cars	Trucks	Total
Jan.	337,937	120,107	458,044
Feb.	337,227	110,901	448,128
Mar.	421,647	124,473	546,120
Apr.	449,593	114,297	563,890
May	410,413	93,920	504,333
June	519,183	113,354	632,537
July	499,457	104,577	604,034
Aug.	575,234	109,028	684,262
Sept.	557,167	94,659	651,826
Oct.	513,561	89,562	603,123
Nov.	388,094	77,041	465,135
Dec.	309,573	78,174	387,747

Annual Production

Year	Passenger Cars	Trucks	Total
1950*	6,955,000	1,340,000	8,295,000
1949	5,319,086	1,230,093	6,549,179
1948	4,080,011	1,465,291	5,545,302
1947	3,723,233	1,329,290	5,052,523
1946	2,247,795	1,021,963	3,269,758
1945	85,654	832,017	917,671
1944	.....	972,000	972,000
1943	.....	965,400	965,400
1942	218,872	1,106,153	1,325,025
1941	3,838,345	1,270,647	5,108,992
1940	3,802,239	890,128	4,692,367
1939	2,965,165	757,553	3,732,718

Ward's Automotive Reports * Estimated



U. S. Bus Production

	1950	1949	1948	1947
January	219	658	1,382	1,273
February	133	418	1,101	1,303
March	199	545	1,430	1,421
April	268	514	1,056	1,650
May	412	564	1,288	1,853
June	606	632	1,068	1,628
July	397	439	1,012	1,806
August	457	444	771	1,765
September	423	303	1,143	1,607
October	545	322	679	1,667
November	...	308	545	1,416
December	...	369	824	1,721

YEARLY TOTALS

1949	5,516	1944	5,799
1948	12,299	1943	1,613
1947	19,110	1942	8,337
1946	10,091	1941	7,626
1945	9,500	1940	6,147

Automobile Manufacturers Association

Aircraft Shipments

Airframe Weight—Thousands of Pounds

1950	Military	Civil	Total
January	1,456.4	509.4	1,965.8
February	2,829.2	397.5	3,226.7
March	2,764.2	396.2	3,160.4
April	3,431.8	424.7	3,856.5
May	3,089.3	498.7	3,588.0
June	3,154.3	548.3	3,702.6
July	2,437.2	456.1	2,893.3
August	3,523.1	512.1	4,035.2
September	3,828.8	498.0	4,326.8
October	.....	.....	.....
November	.....	.....	.....
December	.....	.....	.....

YEARLY TOTALS

1949 Total	29,737.1	6,759.4	36,496.5
1948 Total	25,181.0	10,082.5	35,263.5

U. S. Bureau of the Census

New Transit Equipment Delivered

	Surface Cars	Subway & Elevated Cars	Trolley Coaches	Motor Busses	Total
1949	273	411	677	3,358	4,719
1948	478	206	1,430	7,009	9,123
1947	626	2	955	12,029	13,612
1946	421	...	266	6,463	7,150
1945	332	...	161	4,441	4,934
1944	284	...	55	3,807	4,146
1943	32	...	117	1,251	1,400
1942	284	...	336	7,200	7,820
1941	462	...	411	5,600	6,473
1940	463	15	310	3,984	4,772
1939	371	150	587	3,918	5,026

American Transit Association

Batteries Shipped

Automotive Replacement Only—Thousands

	1950	1949	1948	1947
January	1,467	1,243	2,394	1,509
February	1,174	826	2,254	1,601
March	1,191	560	1,679	1,798
April	915	499	1,211	1,868
May	1,196	685	1,027	1,873
June	1,646	1,059	1,200	1,737
July	2,060	1,637	1,506	1,433
August	2,839	2,648	2,519	2,073
September	2,924	2,786	2,643	2,415
October	....	2,573	2,845	2,854
November	....	2,132	2,541	2,683
December	....	1,694	1,906	2,597

YEARLY TOTALS

1949	18,342	1947	24,441
1948	23,725	1946	17,522
		1945	17,560

Association of American Battery Manufacturers Inc.

Truck Trailers

1950	Production Units	Shipments Units	Shipments Value
Jan.	3,083	3,151	$10,822,000
Feb.	3,493	3,551	12,321,000
Mar.	4,395	4,485	15,338,000
Apr.	4,385	4,487	15,338,000
May	4,867	4,982	17,127,000
June	5,532	5,614	18,684,000
July	5,798	6,173	21,079,000
Aug.	6,593	6,659	22,578,000
Sept.	6,761	6,260	21,083,000
Oct.	....	....	.....
Nov.	...	...	.....
Dec.	....	..	... .

YEARLY TOTALS

1949	33,097	34,273	$119,098,000
1948	44,478	46,960	139,996,000
1947	53,096	55,372	138,383,09[illegible]
1946	76,234	73,001	151,384,06[illegible]

PRODUCTION, UNITS

"C"—Civilian	"M"—Military
1945 ..... 33,266-C	1942 ..... 8,408-[illegible]
83,967-M	71,520-[illegible]
1944 ..... 24,092-C	1941 ..... 41,8[illegible]
185,349-M	1940 ..... 27,11[illegible]
1943 ..... 8,054-C	1939 .. .. 24,18[illegible]
188,811-M	1937 .. .. 21,74[illegible]
	1935 ..... 18,39[illegible]

U. S. Bureau of the Census

Merchant Ship Construction

In Private U. S. Yards†

Yr	No.	Gross Tonnage	Year	No.	Gross Tonnage
19..	34	538,873	1939..	28	241,052
18..	29	164,482	1938..	26	185,658
17..	50	286,473	1937..	15	121,852
16..	88	672,554	1936..	8	63,428
15..	1,067	7,663,362	1935..	2	19,022
14..	1,463	11,404,404	1934..	2	9,544
13..	1,661	12,499,873	1933..	4	49,527
12..	724	5,392,953	1932..	15	145,470
11..	95	749,105	1931..	14	150,949
10..	53	444,727	1930..	16	151,208

n Jan. 1, 1950, 40 vessels aggregating 660,- gross tons were under construction, com- ed with 78 vessels aggregating 1,203,753 ss tons on Jan. 1, 1949.

pbuilders Council of America

Finished Steel Consumption by U. S. Shipbuilders

Year	Net Tons	Per Cent Total Output
1949	668,694	1.1
1948	649,613	1.0
1947	337,961	0.5
1946	283,803	0.6
1945	2,719,000	4.8
1944	10,287,000	16.0
1943	11,509,000	19.2
1942	9,440,000	15.6
1941	2,733,000	4.4
1940	940,000	2.1
1939	518,000	1.3
1938	390,000	1.7
1937	391,000	0.9
1936	288,000	0.8
1935	207,000	0.8
1934	233,000	1.1
1933	115,000	0.6
1932	102,000	0.9
1931	224,000	1.0
1930	371,000	1.1

Shipbuilders Council of America and American Iron & Steel Institute

Naval Shipbuilding

1949 Deliveries from Private Yards

Ty e	No.	Displacement Tonnage
avy Cruiser	2	34,000
ht Cruiser	1	14,700
stroyer Escort	2	4,850
ater Killer Destroyer..	2	4,850
otal	7	58,400

Private Yards' Naval Backlog

Jan. 1, 1950

stroyers	5	17,025
sk Fleet Command Ship	1	13,600
marines	3	4,710
i-Submarine Submarine†	1	750
ater Killer Ship	1	6,000
otal	11	42,085

ne anti-submarine submarine reported in t year's annual report was transferred to avy yard.

pbuilders Council of America

New Locomotives Placed in Service by Class 1 Railroads

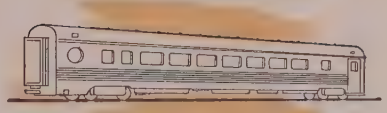
	Diesel	Steam	Electric	Total
1950 (10 mos.)	1,915	9	8	1,932
Jan.	100	1	0	101
Feb.	185	0	0	185
Mar.	197	1	0	198
Apr.	207	1	0	208
May	229	1	0	230
June	204	1	0	205
July	161	1	0	162
Aug.	185	1	3	189
Sept.	213	1	1	215
Oct.	234	1	4	239
Nov.	...	..	..	...
Dec.	...	..	..	...
1949	1,808	57	0	1,865
Jan.	129	7	0	136
Feb.	131	7	0	138
Mar.	216	8	0	224
Apr.	181	10	0	191
May	166	8	0	174
June	146	1	0	147
July	143	4	0	147
Aug.	137	2	0	139
Sept.	132	2	0	134
Oct.	143	4	0	147
Nov.	163	2	0	165
Dec.	121	2	0	123
1948	1,397	86	4	1,487
1947	771	72	2	845
1946	480	83	0	563

Association of American Railroads

Bicycles Shipped

1950*	2,000,000	1946	1,650,000
1949	1,600,000	1942-1945	None
1948	2,750,000	1941	1,830,000
1947	2,750,000	1940	1,300,000
		1939	1,220,000

Bicycle Mfrs. Assn. of America



Railroad Passenger Car Shipments

Number of Cars

	1950	1949	1948	1947	Monthly Avgs.
Jan.	61	91	83	65	1949.... 84
Feb.	64	80	74	87	1948.... 79
Mar.	87	76	94	74	1947.... 74
Apr.	82	85	121	90	1946.... 114
May	113	95	64	63	1945.... 78
June	106	98	46	70	1944.... 84
July	94	68	62	114	1943.... 59
Aug.	104	70	61	24	1942.... 36
Sept.	70	94	65	32	1941.... 30
Oct.	71	90	92	76	1940.... 24
Nov.	..	85	88	107	1939.... 23
Dec.	..	80	96	85	1938.... 36

American Railway Car Institute

Freight Car Awards

Number of Cars

	1950	1949	1948	1947	1946
Jan.	9,366	1,663	8,619	9,222	1,481
Feb.	9,075	332	10,697	13,724	2,328
Mar.	6,201	209	13,227	12,048	4,512
Apr.	3,308	30	17,205	9,186	3,564
May	11,636	589	2,146	7,389	2,900
June	2,095	153	5,368	12,784	3,335
July	30,065	408	10,508	14,840	14,886
Aug.	24,255	185	3,249	2,352	9,527
Sept.	25,611	123	738	9,917	11,102
Oct.	21,893	201	8,330	16,737	3,407
Nov.	10,573	1,145	4,352	8,079	7,190
Dec.	.....	1,220	8,348	4,030	3,011
Total	.....	.....	92,787	120,308	67,193

American Railway Car Institute

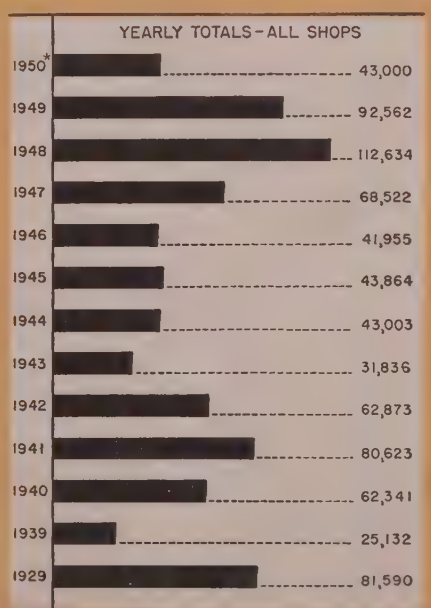
FREIGHT CAR SHIPMENTS

Domestic—Number of Cars

1950	Car-Builders	Railroad Shops	Total No. Cars
Jan.	1,006	1,389	2,395
Feb.	917	1,129	2,046
Mar.	830	882	1,712
Apr.	223	748	971
May	1,211	982	2,193
June	3,165	709	3,874
July	2,138	1,326	3,464
Aug.	2,787	2,416	5,203
Sept.	2,395	2,736	5,131
Oct.	2,444	3,057	5,501
Nov.	3,352	2,439	5,791
Dec.	.....	.....	.....

1949	Car-Builders	Railroad Shops	Total No. Cars
Jan.	6,130	2,783	8,913
Feb.	7,421	2,894	10,315
Mar.	8,958	2,952	11,910
Apr.	8,499	2,288	10,787
May	6,879	2,646	9,525
June	5,805	3,316	9,121
July	3,655	2,779	6,434
Aug.	4,245	2,933	7,178
Sept.	3,936	2,205	6,141
Oct.	2,828	1,704	4,532
Nov.	2,649	1,727	4,376
Dec.	1,950	1,380	3,330

American Railway Car Institute
* Estimated



Appliances

METALWORKING FACTS AND FIGURES

Automatic Tumbler Dryers

Factory Sales—Units

	1950	1949
January	19,495	9,437
February	19,389	9,407
March	27,125	8,429
April	25,140	4,458
May	16,122	3,910
June	20,568	2,496
July	23,588	2,775
August	32,318	5,526
September	31,399	10,806
October	28,882	15,760
November	.....	17,441
December	.....	15,282
Total	.....	105,727

American Home Laundry Manufacturers' Association

Rigid Steel Conduit and Fittings

Shipments—Net Tons

	1950	1949	1948
January	15,674	22,705	20,882
February	16,100	21,630	22,730
March	17,708	24,590	23,194
April	16,515	21,931	24,653
May	17,219	17,566	22,415
June	21,645	13,240	22,704
July	24,723	12,568	23,072
August	30,543	12,400	19,241
September	29,123	14,992	22,456
October	25,875	17,683	24,588
November	.....	12,662	27,650
December	.....	20,946	28,113

YEARLY TOTALS

1949	212,913	1947	258,134
1948	281,698	1946	198,144
	1945	127,732	

Office of Domestic Commerce

Mechanical Stokers

Factory Sales—Number of Units

	1950 Small†	1950 Large†	1949 Small†	1949 Large†
Jan.	1,181	252	1,727	453
Feb.	585	180	1,635	345
Mar.	596	212	1,697	295
Apr.	763	198	1,393	274
May	632	245	1,382	336
June	1,233	443	2,411	538
July	1,967	485	2,083	492
Aug.	3,931	826	3,746	845
Sept.	3,081	800	6,117	832
Oct.	2,532	647	3,860	701
Nov.	....	...	2,010	456
Dec.	....	...	1,250	382

YEARLY TOTALS

	Small†	Large†		Small†	Large†
1949..	29,311	5,949	1944..	31,603	11,355
1948..	77,220	8,938	1943..	17,765	15,074
1947..	61,596	7,312	1942..	79,062	8,938
1946..	181,223	9,695	1941..	182,956	9,491
1945..	119,079	11,745	1940..	144,758	8,067
		1939..	96,245	8,044	

† Small consists of classes 1 and 2 as defined by U. S. Bureau of the Census and large consists of classes 3, 4 and 5.

Steel Kitchen Cabinets

(Factory Sales)

	Units	Retail Value
1950*	3,262,000	$145,000,000
1949	2,658,000	105,000,000
1948	3,500,000	138,000,000
1947	2,790,000	104,000,000

Steel Kitchen Cabinet Institute

Oil Burners

Shipments—Burners and Units

	1950 Residential	1950 Com'l, Indus'l	1949 Residential	1949 Com' Indus
Jan.	35,037	1,613	24,595	1,78
Feb.	34,913	1,895	22,421	1,67
Mar.	49,684	2,301	24,404	1,58
Apr.	44,053	2,155	23,852	1,64
May	61,918	2,083	33,298	1,62
June	78,124	2,438	45,068	1,85
July	95,986	2,670	39,811	1,80
Aug.	134,846	3,741	72,255	2,64
Sept.	111,804	3,976	92,402	2,78
Oct.	.....	....	94,590	2,57
Nov.	.....	....	58,057	2,42
Dec.	.....	....	38,692	2,10
Total	.....	....	569,445	24,46

YEARLY TOTALS

	Residential	Com'l, Indus'l		Residential	Com' Indus
1948..	392,625	27,043	1941..	271,673†	32,18
1947..	1,078,576	48,776	1940..	247,663†	16,56
1946..	499,009	37,306	1939..	201,735†	13,28
1945..	139,611	30,750	1938..	129,323†	9,84
1944..	45,752†	31,329	1937..	177,675†	15,56
1943..	27,956†	44,602	1936..	182,130†	14,74
1942..	82,357†	48,674	1935..	126,820†	12,09

† Includes water heating units
U. S. Bureau of the Census

Floor and Wall Furnaces

Factory Shipments

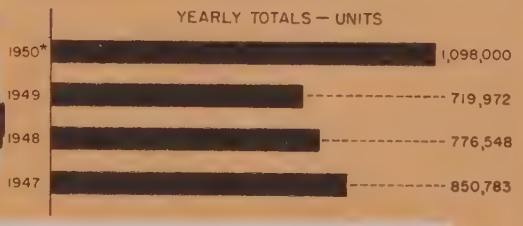
	1950 Number of Units	1950 Value, Thousands of Dollars	1949 Number of Units	1949 Value Thousan of Dolla
Jan.	33,312	1,782	22,118	1,229
Feb.	25,835	1,317	15,751	851
Mar.	32,201	1,701	18,034	1,012
Apr.	36,010	2,007	18,962	1,004
May	41,026	2,203	19,230	1,043
June	50,419	2,739	25,918	1,468
July	67,318	3,636	28,380	1,575
Aug.	100,715	5,665	57,017	3,234
Sept.	86,614	5,179	68,744	3,979
Oct.	.....	....	78,461	4,378
Nov.	.....	....	59,872	3,408
Dec.	.....	....	36,437	1,951

YEARLY TOTALS

	Number of Units	Value, Thousands of Dollars
1949	448,924	25,132
1948	529,672	28,909

U. S. Bureau of the Census

WARM AIR FURNACES



Shipments

	1950 Number of Units	1950 Value, Thousands of Dollars	1949 Number of Units	1949 Value, Thousands of Dollars
Jan.	39,887	7,376	31,374	5,843
Feb.	45,618	7,973	33,011	5,923
Mar.	59,982	10,739	41,271	7,085
Apr.	58,798	10,585	34,471	6,163
May	78,349	13,813	42,406	7,590
June	98,517	17,688	55,916	10,176
July	102,189	18,553	48,575	8,735
Aug.	145,512	27,033	85,320	15,432
Sept.	139,014	26,216	112,264	19,767
Oct.	.....	.....	103,401	19,218
Nov.	.....	.....	79,280	14,469
Dec.	.....	.....	52,323	10,147

Yearly Totals	Number of units	Value, in dollars
1949	719,972	130,548,000
1948	776,548	136,936,932
1947	850,783	141,943,102
1946	699,058	88,016,228
1945	372,974	37,938,586

U. S. Bureau of the Census * Estimated

Cast Iron Boilers, Radiators and Convectors

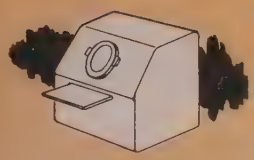
Shipments

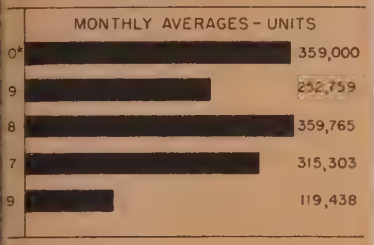
	Boilers Thousands of lb 1950	Boilers Thousands of lb 1949	Radiation† Thousands of sq 1950	Radiation† Thousands of sq 19
Jan.	10,595	10,632	2,678	2,4
Feb.	10,534	8,239	2,966	1,8
Mar.	11,144	7,127	3,015	1,4
Apr.	12,573	6,042	2,440	1,5
May	15,349	8,528	2,025	1,5
June	19,386	13,155	3,513	2,2
July	25,747	14,265	4,020	2,7
Aug.	40,329	27,270	6,449	4,1
Sept.	40,153	33,839	5,714	5,3
Oct.	.....	36,989	....	5,9
Nov.	.....	25,185	....	4,1
Dec.	.....	15,025	....	2,8

YEARLY TOTALS

	Boilers Thousands of lb	Radiation† Thousands of sq
1949	206,296	35,888
1948	263,302	60,333
1947	326,129	56,719
1946	249,765	38,358

† Includes radiators and convectors
U. S. Bureau of the Census





WASHERS

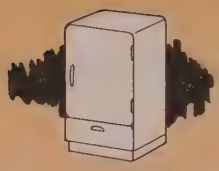
Sales Billed—Units

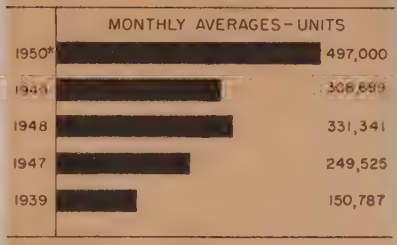
	1950	1949	1948
Jan.	275,576	172,400	360,445
Feb.	342,967	201,300	367,909
Mar.	423,802	242,500	408,512
Apr.	333,072	192,500	402,257
May	304,640	211,700	377,895
June	325,217	260,700	392,496
July	282,261	200,900	326,181
Aug.	381,452	323,789	362,169
Sept.	424,043	357,281	433,919
Oct.	439,924	333,728	382,400
Nov.	.....	298,717	319,300
Dec.	.....	237,591	183,700

YEARLY TOTALS

1949	3,033,106	1947	3,783,632
1948	4,317,183	1946	2,023,981
		1945-43†	None

† Civilian production curtailed from July, 1942, to December, 1945.
American Home Laundry Manufacturers' Association





ELECTRIC REFRIGERATORS

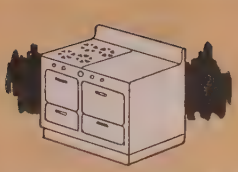
Domestic Sales—Units

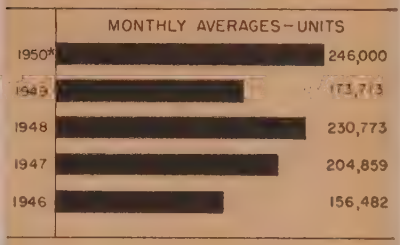
	1950	1949	1948
Jan.	364,002	380,853	272,121
Feb.	450,751	337,424	281,580
Mar.	572,691	369,216	338,109
Apr.	531,498	324,370	330,720
May	528,506	330,753	317,763
June	534,489	296,199	373,115
July	490,802	315,444	351,094
Aug.	496,486	307,622	281,345
Sept.	512,125	309,429	344,260
Oct.	399,330	252,580	380,854
Nov.	.....	221,221	374,470
Dec.	.....	259,158	330,660

YEARLY TOTALS

1949	3,704,269	1944	40,034
1948	3,976,091	1943	156,697
1947	2,994,297	1942	378,725
1946	1,811,326	1941	3,303,572
1945	267,061	1940	2,528,566
		1939	1,809,445

National Electrical Manufacturers Assn.





HOUSEHOLD GAS RANGES†

Shipments—Units

	1950	1949	1948
Jan.	167,221	108,829	210,865
Feb.	209,156	119,251	223,756
Mar.	265,829	155,721	252,036
Apr.	239,706	155,170	247,403
May	244,080	155,588	252,929
June	220,936	164,016	259,675
July	256,075	126,630	201,532
Aug.	333,439	210,976	248,663
Sept.	288,809	232,005	260,508
Oct.	.....	263,563	259,513
Nov.	.....	246,398	215,715
Dec.	.....	181,113	136,683

YEARLY TOTALS

1949	2,119,260	1947	2,458,305
1948	2,769,278	1946	1,877,780
		1945	1,018,462

† Including bungalow and combination.
U. S. Bureau of the Census

Electric Roasters

Domestic Sales Billed—Units

	1950	1949
uary	25,480	29,858
ruary	36,456	39,791
ch	23,084	21,453
il	19,907	11,227
	18,736	9,468
e	25,513	14,635
	36,350	11,460
ust	41,425	20,882
ember	38,383	41,246
ber	37,939	43,482
ember	.....	43,981
ember	.....	36,780
otals	.....	324,263

ional Electrical Manufacturers Association

Electric Broilers

Domestic Sales Billed—Units

	1950	1949
January	4,438	6,742
February	3,301	5,126
March	4,060	4,650
April	4,166	3,272
May	3,129	2,519
June	4,148	2,515
July	5,364	1,559
August	10,112	1,843
September	12,731	2,059
October	8,287	7,432
November	.....	5,814
December	.....	3,617
Totals	.....	47,148

National Electrical Manufacturers Association

Domestic Heating Stoves

Shipments—1950

	Coal, Wood	Gas	Oil	Total
Jan.	12,088	48,215	35,605	95,908
Feb.	6,366	42,419	44,806	93,591
Mar.	16,597	59,334	32,140	108,071
Apr.	21,376	69,721	38,967	130,064
May	34,975	101,258	54,084	190,317
June	51,160	137,945	105,267	294,372
July	74,704	228,936	129,731	433,371
Aug.	172,497	321,487	291,366	785,350
Sept.	173,145	277,940	207,722	658,807

YEARLY TOTALS

	Coal, Wood	Gas	Oil	Total
1949	955,571	1,441,335	1,265,865	3,662,771
1948	1,203,606	2,083,990	1,939,693	5,227,289
1947	1,305,648	2,619,895	2,412,216	6,337,759

U. S. Bureau of the Census

Electric Water Heaters

omestic Unit Sales of Storage Tank Type

	1950	1949	1948
uary	43,842	31,576	53,996
ruary	52,249	39,683	55,573
ch	63,932	40,529	64,768
il	61,950	38,248	58,294
	65,645	43,782	60,985
e	75,509	48,759	72,610
	63,463	40,118	57,911
ust	74,380	45,778	62,891
ember	79,383	50,790	70,575
ber	76,087	50,383	58,974
ember	.....	39,242	52,071
ember	.....	39,926	37,741

YEARLY TOTALS

	508,814	1944	31,527
	706,389	1943	24,720
	817,717	1942	80,986
	399,826	1941	177,042
	129,722	1940	98,005
		1939	80,777

ional Electrical Manufacturers Association

Standard Vacuum Cleaners

Sales Billed—Units

	1950	1949	1948
Jan.	249,150	228,769	304,273
Feb.	263,515	241,574	311,448
Mar.	361,014	309,897	355,415
Apr.	292,664	252,656	306,588
May	278,645	222,850	276,657
June	250,190	207,354	256,071
July	279,967	161,920	229,537
Aug.	341,232	219,909	237,202
Sept.	327,524	250,036	280,084
Oct.	331,445	272,520	281,573
Nov.	265,310	253,516	255,080
Dec.	.....	265,513	274,180

YEARLY TOTALS

1949	2,886,514	1947	3,800,687
1948	3,368,108	1946	2,289,441
		1945-43†	None

† Civilian production curtailed from January, 1943, to December, 1945.
Vacuum Cleaner Manufacturers Association

Household Electric Ranges

Domestic Sales—Units

	1950	1949	1948
Jan.	97,139	106,473	103,585
Feb.	118,059	87,370	103,506
Mar.	144,123	87,543	127,461
Apr.	131,182	59,894	104,677
May	144,093	52,286	98,983
June	156,571	68,107	123,300
July	129,072	62,402	83,485
Aug.	130,651	66,222	116,107
Sept.	152,852	91,073	128,829
Oct.	128,367	72,672	122,516
Nov.	.....	59,325	123,661
Dec.	.....	74,586	105,387

YEARLY TOTALS

1949	887,953	1944	42,712
1948	1,341,497	1943	8,480
1947	1,016,536	1942	161,312
1946	542,168	1941	683,859
1945	146,046	1940	404,239
		1939	296,846

National Electrical Manufacturers Association

Appliances

METALWORKING FACTS AND FIGURES

Standard-Size Ironers

Factory Sales—Units

	1950	1949	1948	1947
Jan.	20,300	28,300	40,192	31,509
Feb.	27,600	28,400	51,651	39,239
Mar.	37,800	23,800	53,686	42,442
Apr.	31,600	18,100	47,319	51,409
May	27,400	19,500	44,954	51,685
June	27,100	21,100	32,767	52,025
July	25,100	17,700	26,679	41,911
Aug.	42,700	32,300	35,203	47,577
Sept.	41,400	27,700	37,308	53,277
Oct.	47,500	36,045	38,517	58,605
Nov.	.....	35,000	42,000	58,980
Dec.	.....	19,400	26,000	70,599

YEARLY TOTALS

1949	307,345	1942†	66,090
1948	476,276	1941	259,668
1947	599,258	1940	175,466
1946	124,616	1939	127,093
1945–43†	None		

† Civilian production stopped from mid-1942 through 1945.

American Home Laundry Manufacturers' Association.

Electric Flat Irons

Domestic Sales Billed—Units

	1950	1949
January	196,915	184,900
February	405,927	453,551
March	491,803	347,962
April	327,044	141,288
May	421,276	220,829
June	417,929	220,341
July	404,879	323,719
August	557,982	451,197
September	663,474	411,509
October	502,293	380,957
November	.....	426,874
December	.....	246,319
Totals	.....	3,809,446

National Electrical Manufacturers Association

Electric Toasters

Domestic Sales Billed—Units

	Automatic		Nonautomatic	
	1950	1949	1950	1949
Jan.	239,031	279,377	11,995	9,547
Feb.	263,051	298,933	11,150	20,327
Mar.	223,726	336,962	10,119	11,134
Apr.	191,196	185,786	5,799	8,578
May	204,296	163,758	4,859	7,005
June	149,140	147,583	5,582	3,484
July	242,467	133,759	8,447	4,674
Aug.	432,810	223,887	35,703	12,291
Sept.	476,916	299,579	26,440	17,262
Oct.	355,359	324,740	33,034	34,465
Nov.	.....	344,506	.....	23,742
Dec.	.....	370,606	.....	21,652
Totals	.....	3,109,476	.....	174,161

National Electrical Manufacturers Association

Electric Freezers

(Home and Farm)

Domestic Sales Billed—Units

	1950	1949
January	31,629	26,942
February	38,863	23,762
March	51,665	26,585
April	42,002	21,284
May	36,716	19,936
June	52,314	27,339
July	76,213	30,750
August	75,640	35,229
September	61,951	30,180
October	63,240	19,928
November	.....	23,369
December	.....	23,923
Totals	.....	309,227

National Electrical Manufacturers Association

Steel Boilers

New Orders

(100 sq ft or more of heating surface)

GRAND TOTAL—ALL TYPES

	Number	Sq ft
1949	14,346	13,094,902
1948	16,408	18,419,968
1947	16,110	18,751,755
1946	19,473	22,645,814
1945	13,076	18,372,439
1944	8,670	13,022,626
1943	10,994	25,587,435
1942	15,647	39,570,941
1941	14,454	27,169,993
1940	10,823	18,250,063

STATIONARY BOILERS

1949	5,190	8,097,503
1948	6,354	12,628,660
1947	8,140	14,786,298
1946	10,452	18,652,274
1945	7,317	13,244,916
1944	5,006	7,260,313
1943	4,534	5,950,027
1942	6,155	15,656,704
1941	5,253	13,314,573
1940	3,991	9,898,268

MARINE BOILERS

1949	76	281,999
1948	153	964,106
1947	35	109,753
1946	96	121,705
1945	688	2,653,800
1944	1,312	4,535,814
1943	4,080	18,346,455
1942	4,774	20,771,539
1941	2,123	9,970,792
1940	1,230	5,643,521

STEEL HEATING BOILERS

1949	9,080	4,715,400
1948	9,901	4,827,202
1947	7,935	3,855,704
1946	8,925	3,871,835
1945	5,071	2,473,723
1944	2,352	1,226,499
1943	2,080	1,290,953
1942	4,718	3,142,698
1941	7,078	3,884,628
1940	5,602	2,708,274

U. S. Bureau of the Census

Gas Water Heaters

Shipments—Underfired and Sidearm Types

	1950		1949	
	Units	Value, Thousands of Dollars	Units	Value, Thousands of Dollars
Jan.	149,759	6,193	105,054	4,913
Feb.	168,260	6,888	97,210	4,532
Mar.	189,569	8,089	121,119	5,755
Apr.	191,547	8,384	126,996	6,050
May	211,233	9,301	134,639	6,363
June	225,595	9,717	148,020	6,955
July	214,858	9,203	128,625	5,656
Aug.	280,205	12,176	155,819	6,714
Sept.	240,047	10,261	165,804	7,135
Oct.	.....	.....	171,267	7,466
Nov.	.....	.....	156,363	6,548
Dec.	.....	.....	145,469	6,019

YEARLY TOTALS

	1949	1948	1947
Units	1,656,385	1,730,331	2,056,536
Value	$74,106,000	$77,034,830	$86,377,903

U. S. Bureau of the Census

Radio, Television Receivers

Number Produced

	Radios			Tel
1950	Home	Auto	Portable	visi
Jan.	581,000	329,000	69,000	424
Feb.	505,000	379,000	120,000	536
Mar.	587,000	389,000	114,000	643
Apr.	526,000	273,000	143,000	432
May	796,000	291,000	351,000	567
June	710,000	567,000	262,000	522
July	391,170	234,025	97,323	330
Aug.	754,232	320,980	128,255	702
Sept.	831,837	356,888	129,070	817
Oct.	942,245	385,171	86,147	813
Nov.	815,635	427,758	60,706	752

YEARLY TOTALS—RADIOS

	Units	Value (Manufacture
1949	11,400,000*	$310,000,0
1948	16,500,000*	525,000,0
1947	20,000,000*	650,000,0
1946	15,955,000	434,244,0
1942†	4,306,984	102,968,7
1941	13,642,334	233,841,1
1940	11,831,187	176,626,9
1939	10,762,631	158,421,1
1938	7,141,811	112,263,0
1937	8,083,144	165,390,9
1936	8,248,755	169,859,7
1935	6,030,508	128,399,1
1934	4,478,967	94,859,4
1933	4,157,045	70,269,4
1932	2,446,143	54,374,7
1931	3,593,993	104,705,4
1930	3,788,961	155,432,3

YEARLY TOTALS—TELEVISION

	Units	Value (Manufacture
1949	3,000,000*	$580,000,0
1948	975,000*	230,000,0
1947	178,571	50,000,0
1946	6,476	1,250,0

*Estimated.

†Civilian production was curtailed fr April, 1942, to December, 1945.

Radio-Television Manufacturers Associat

Plumbing Fixtures

Shipments—Value in Thousands of Dollars

VITREOUS CHINA AND GLAZED EARTHENW

Qtr.	1950	1949	1948	194
1st	$20,992	$20,319	$17,976	$13,
2nd	23,513	17,547	19,398	14,
3rd	.....	18,470	21,459	14,
4th	.....	20,821	25,168	18,
Total	.....	$77,157	$84,001	$60,

METAL—EXCLUSIVE OF FITTINGS

Qtr.	1950	1949	1948	19
1st	$41,682	$27,919	$41,086	$28,
2nd	48,137	28,787	40,850	29,
3rd	.....	39,255	41,189	28,
4th	.....	43,267	48,038	39,
Total	.....	$139,228	$171,163	$126,

U. S. Bureau of the Census

Shipments by Screw Machine Products Industry

Index—1940=100

	1950	1949	YEARLY AVERAGES	
Jan.	183	200	1949...167	1937..
Feb.	165	193	1948...204	1936..
Mar.	193	203	1947...219	1935..
Apr.	202	176	1946...220	1934..
May	224	147	1945...292	1933..
June	227	140	1944...400	1932..
July	203	115	1943...481	1931..
Aug.	287	157	1942...388	1930..
Sept.	266	160	1941...221	1929..
Oct.	294	174	1940...100	1928..
Nov.	...	174	1939... 75	1927..
Dec.	...	162	1938... 48	1926..

National Screw Machine Products Associat

INDEXES OF INDUSTRIAL PRODUCTION

FEDERAL RESERVE BOARD—1935-1939=100

Total Industrial Production

Adjusted for Seasonal Variation

	1950	1949	1948	1947	1946
Jan.	183	191	193	189	160
Feb.	180	189	194	189	152
Mar.	187	184	191	190	168
Apr.	190	179	188	187	165
May	195	174	192	185	159
June	199	169	192	184	170
July	196	161	186	176	172
Aug.	209	170	191	182	178
Sept.	212	174	192	186	180
Oct.	215	166	195	191	182
Nov.	214	173	195	192	183
Dec.	...	179	192	192	182

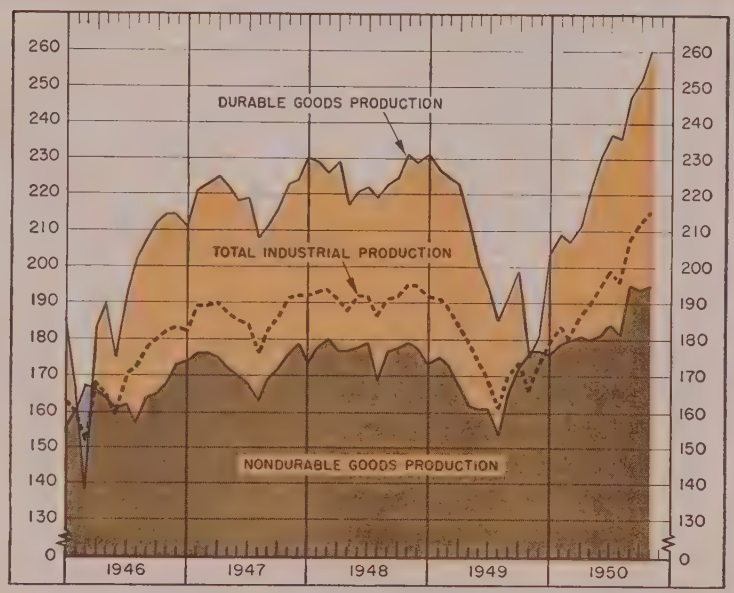
YEARLY INDEXES—UNADJUSTED

1950*	200	1946	170	1942	199
1949	176	1945	203	1941	162
1948	192	1944	235	1940	125
1947	187	1943	239	1939	109

Iron and Steel

Adjusted for Seasonal Variation

	1950	1949	1948	1947	1946
Jan.	203	228	203	193	102
Feb.	201	232	203	192	43
Mar.	205	233	207	197	169
Apr.	222	219	177	196	159
May	226	204	208	198	109
June	231	177	208	194	154
July	228	156	201	182	180
Aug.	236	178	207	189	184
Sept.	245	179	214	190	185
Oct.	254	102	221	205	184
Nov.	...	145	224	203	178
Dec.	...	201	223	206	159



Nonferrous Metals and Products Output

Adjusted for Seasonal Variation

	1950	1949	1948	1947	1946
Jan.	180	183	195	203	150
Feb.	190	185	199	208	141
Mar.	200	183	201	202	139
Apr.	198	167	200	197	132
May	197	145	196	187	128
June	207	133	193	179	137
July	202	127	185	171	150
Aug.	212	141	186	170	159
Sept.	218	157	192	174	172
Oct.	223	164	192	179	184
Nov.	...	163	188	185	192
Dec.	...	166	184	189	197

Durable Goods

Adjusted for Seasonal Variation

	1950	1949	1948	1947	1946
Jan.	209	227	229	221	166
Feb.	207	225	226	223	138
Mar.	211	223	229	225	183
Apr.	222	212	217	222	190
May	231	201	221	218	175
June	237	194	222	219	193
July	235	185	219	208	202
Aug.	247	193	223	211	208
Sept.	252	199	225	216	212
Oct.	260	175	231	223	214
Nov.	256	181	229	224	214
Dec.	...	203	231	230	211

Nondurable Goods

Adjusted for Seasonal Variation

	1950	1949	1948	1947	1946
Jan.	179	175	178	176	161
Feb.	180	173	180	176	167
Mar.	181	168	177	175	166
Apr.	180	162	177	172	164
May	181	161	178	170	161
June	184	161	179	168	162
July	181	154	169	163	157
Aug.	195	165	177	169	164
Sept.	194	172	178	172	165
Oct.	195	177	179	176	168
Nov.	195	177	178	179	173
Dec.	...	176	173	173	174

Consumers' Price Index

Cost of Living. 1935—1939=100

	1950	1949	1948	1947
January	166.9	170.9	168.8	153.3
February	166.5	169.0	167.5	153.2
March	167.0	169.5	166.9	156.3
April	167.3	169.7	169.3	156.2
May	168.6	169.2	170.5	156.0
June	170.2	169.6	171.7	157.1
July	172.5	168.5	173.7	158.4
August	173.0	168.8	174.5	160.3
September	173.8	169.6	174.5	163.8
October	174.8	168.5	173.6	163.8
November	....	168.6	172.2	164.9
December	....	167.5	171.4	167.0

MONTHLY AVERAGES

1950*	170.9	1944	125.5
1949	169.1	1943	123.6
1948	171.2	1942	116.5
1947	159.2	1941	105.2
1946	139.3	1940	100.2
1945	128.4	1939	99.4

U. S. Bureau of Labor Statistics

Wholesale Price Indexes

(1926=100)

ALL COMMODITIES

	1950	1949	1948	1947
Jan.	151.5	160.6	165.7	142.0
Feb.	152.7	158.1	160.9	145.2
Mar.	152.7	158.4	161.4	150.0
Apr.	152.9	156.9	162.8	148.0
May	155.9	155.7	163.9	147.3
June	157.3	154.5	166.2	147.7
July	162.9	153.5	168.7	150.6
Aug.	166.4	152.9	169.8	153.7
Sept.	169.5	153.5	168.9	157.4
Oct.	169.1	152.2	165.4	158.5
Nov.	171.3	151.6	164.0	159.6
Dec.	....	151.2	162.4	163.2

MONTHLY AVERAGES

1950*	161.1	1944	104.0
1949	155.0	1943	103.1
1948	165.1	1942	98.8
1947	152.1	1941	87.3
1946	121.1	1940	78.6
1945	105.8	1939	77.1

MANUFACTURED PRODUCTS

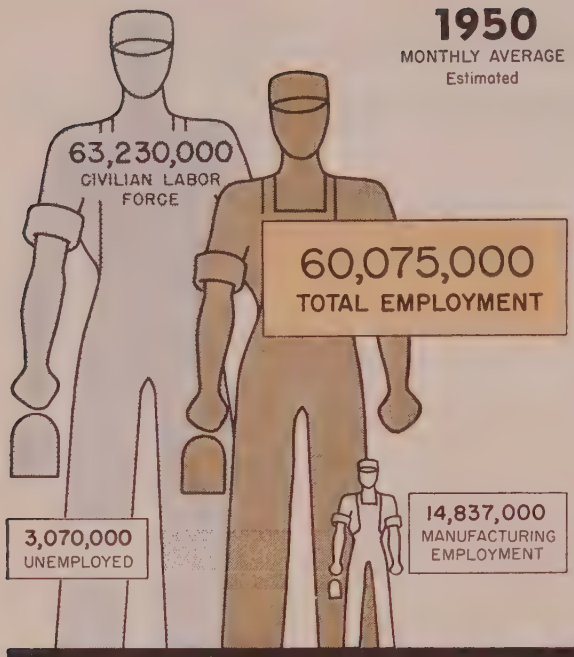
	1950	1949	1948	1947
Jan.	148.2	156.2	157.8	137.3
Feb.	149.1	154.0	154.5	140.5
Mar.	148.9	154.1	155.8	143.8
Apr.	149.4	153.0	157.6	142.1
May	152.2	151.5	158.5	142.0
June	153.5	150.7	159.6	142.0
July	158.0	149.7	162.6	144.2
Aug.	161.2	149.4	164.6	147.9
Sept.	164.0	150.1	163.9	151.8
Oct.	163.5	149.1	160.2	151.2
Nov.	....	148.2	158.7	152.4
Dec.	....	147.9	157.5	154.9

MONTHLY AVERAGES

1950*	156.4	1944	100.8
1949	151.2	1943	100.1
1948	159.4	1942	98.6
1947	146.0	1941	89.1
1946	116.1	1940	81.6
1945	101.8	1939	80.4

U. S. Bureau of Labor Statistics

* Estimated



TOTAL U.S. EMPLOYMENT

(In Thousands)

1950 By Months

	Civilian Labor Force	Total Employment	Unemployment	Mfg. Employment
Jan.	61,427	56,947	4,480	13,980
Feb.	61,637	56,953	4,684	13,997
Mar.	61,675	57,551	4,123	14,103
Apr.	62,183	58,668	3,515	14,162
May	62,788	59,731	3,057	14,413
June	64,866	61,482	3,384	14,666
July	64,427	61,214	3,213	14,777
Aug.	64,867	62,367	2,500	15,442
Sept.	63,567	61,226	2,341	15,687
Oct.	63,704	61,764	1,940	15,757
Nov.	63,512	61,271	2,240	.....

1949 By Months

Jan.	60,078	57,414	2,664	14,782
Feb.	60,388	57,167	3,221	14,649
Mar.	60,814	57,647	3,167	14,475
Apr.	60,835	57,819	3,016	14,177
May	61,983	58,694	3,289	13,877
June	63,398	59,619	3,778	13,884
July	63,815	59,720	4,095	13,757
Aug.	63,637	59,947	3,689	14,114
Sept.	62,763	59,411	3,351	14,312
Oct.	62,576	59,001	3,576	13,892
Nov.	62,927	59,518	3,409	13,807
Dec.	62,045	58,556	3,489	14,031
1949 Av.	62,105	58,709	3,395	14,146

1948 By Months

Jan.	59,214	57,149	2,065	15,408
Feb.	59,778	57,139	2,639	15,345
Mar.	59,769	57,329	2,440	15,369
Apr.	60,524	58,330	2,193	15,028
May	60,422	58,660	1,761	14,947
June	63,479	61,296	2,184	15,107
July	63,842	61,615	2,227	15,155
Aug.	63,186	61,245	1,941	15,400
Sept.	62,212	60,312	1,899	15,617
Oct.	61,775	60,134	1,642	15,514
Nov.	61,724	59,893	1,831	15,368
Dec.	61,375	59,434	1,941	15,174
1948 Av.	61,442	59,378	2,064	15,286

MONTHLY AVERAGES

1947	60,168	58,027	2,142	15,247
1946	57,520	55,250	2,270	14,461
1945	53,860	52,820	1,040	15,302
1944	54,630	53,960	670	17,111
1943	55,540	54,470	1,070	17,381
1942	56,410	53,750	2,660	15,051
1941	55,910	50,350	5,560	12,974
1940	55,640	47,520	8,120	10,780
1939	55,230	45,750	9,480	10,078
1938	54,610	44,220	10,390	9,253
1937	54,000	46,300	7,700	10,606
1936	53,440	44,410	9,030	9,653

U. S. Department of Labor
U. S. Department of Commerce

Steel Employment, Wages, Hours and Payrolls

1950 By Months

	Number Employees	Av. Hrly. Earnings	Av. Hrs. per Week	Total Payrolls
Jan.	609,400	$1.720	38.5	$189,346,000
Feb.	613,400	1.704	38.8	174,723,000
Mar.	615,600	1.697	38.8	189,964,000
Apr.	621,100	1.707	38.5	186,185,000
May	628,200	1.722	39.7	199,905,000
June	635,900	1.714	39.3	195,332,000
July	643,000	1.744	35.5	188,711,000
Aug.	648,900	1.717	39.7	206,623,000
Sept.	649,500	1.757	39.4	203,783,000
Oct.	650,400	1.726	40.7	212,187,000

1949 By Months

Jan.	650,200	$1.712	38.9	$202,057,000
Feb.	652,800	1.696	40.1	189,751,000
Mar.	651,700	1.685	40.6	207,152,000
Apr.	646,600	1.688	38.5	191,886,000
May	637,400	1.697	37.0	188,439,000
June	624,500	1.684	37.6	181,787,000
July	609,600	1.699	31.8	160,301,000
Aug.	603,100	1.682	36.5	175,607,000
Sept.	600,200	1.712	36.8	173,450,000
Oct.-Nov.	583,800	1.782	17.7	206,590,000
Dec.	602,400	1.706	38.1	184,750,000
Year 1949	620,500	1.703	34.5	$2,061,770,000

1948 By Months

Jan.	622,000	$1.573	39.6	$180,253,000
Feb.	626,200	1.551	39.1	167,600,000
Mar.	628,800	1.548	40.6	183,045,000
Apr.	626,200	1.551	38.0	168,500,000
May	627,600	1.577	38.0	175,300,000
June	633,600	1.569	39.9	179,483,000
July	641,000	1.645	36.4	179,846,000
Aug.	644,500	1.689	38.1	193,800,000
Sept.	641,000	1.718	40.1	199,400,000
Oct.	644,100	1.699	39.5	201,668,000
Nov.	646,200	1.721	39.8	199,800,000
Dec.	647,600	1.694	40.0	205,848,000
Year 1948	635,600	1.630	39.1	2,234,461,000

1947 By Months

Jan.	601,200	$1.381	40.3	$155,778,000
Feb.	606,700	1.370	39.0	139,482,000
Mar.	608,800	1.379	38.2	150,560,000
Apr.	610,700	1.533	40.0	168,266,000
May	614,800	1.556	39.1	175,793,000
June	622,600	1.547	38.1	167,625,000
July	623,000	1.539	35.9	163,200,000
Aug.	625,000	1.556	37.1	169,100,000
Sept.	618,000	1.571	38.3	168,900,000
Oct.	620,000	1.546	40.6	180,100,000
Nov.	624,000	1.587	38.1	171,000,000
Dec.	620,900	1.565	38.6	175,273,000
Year 1947	616,300	1.513	38.6	1,986,600,000

MONTHLY AVERAGES

(Total Payrolls)

1949	620,500	$1.703	34.5	$2,061,770,000
1948	635,600	1.630	39.1	2,234,461,000
1947	616,300	1.513	38.6	1,986,600,000
1946	575,300	1.347	35.1	1,544,142,000
1945	551,200	1.248	44.2	1,645,332,700
1944	571,200	1.219	46.7	1,745,019,700
1943	625,700	1.135	43.0	1,649,227,000
1942	647,200	1.056	38.9	1,467,058,700
1941	633,000	.959	38.6	1,301,347,800
1940	546,800	.850	36.2	960,779,300
1939	482,585	.840	34.8	812,775,082
1938	442,739	.830	27.6	613,198,987
1937	572,244	.818	36.8	976,083,169
1936	499,704	.868	39.8	758,059,542

American Iron & Steel Institute

Employment & Wages

METALWORKING FACTS AND FIGURES

METALWORKING, WAGES & HOURS (Production Workers)

(Average Hourly Wages and Average Weekly Hours)

	PRIMARY METALS		FABRICATED METAL PRODUCTS		MACHINERY Except Electrical		ELECTRICAL MACHINERY		TRANSPORTATION EQUIPMENT		INSTRUMENTS Related Products	
	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours
950												
Jan.	$1.615	39.5	$1.487	40.3	$1.547	39.8	$1.443	40.5	$1.682	40.5	$1.423	39.7
Feb.	1.603	39.6	1.481	40.3	1.552	40.3	1.442	40.4	1.677	39.7	1.425	39.9
Mar.	1.604	38.9	1.480	40.3	1.560	40.6	1.443	40.5	1.678	40.2	1.435	40.0
Apr.	1.609	40.4	1.488	40.7	1.569	41.0	1.446	40.6	1.706	41.3	1.438	40.0
May	1.619	40.5	1.496	40.7	1.576	41.3	1.453	40.8	1.698	41.0	1.444	40.4
June	1.630	40.8	1.515	41.5	1.583	41.5	1.451	40.4	1.727	42.0	1.448	40.7
July	1.645	40.7	1.522	41.1	1.595	41.6	1.464	40.6	1.728	41.5	1.442	40.9
Aug.	1.640	41.3	1.535	42.2	1.604	42.3	1.465	41.1	1.753	41.9	1.464	41.1
Sept.	1.673	41.5	1.560	42.2	1.627	42.5	1.483	41.5	1.766	41.0	1.499	42.0
Oct.	1.670	42.2	1.573	42.2	1.648	42.8	1.512	42.2	1.780	41.6	1.508	42.2
949 (Av.)	1.587	38.3	1.460	39.6	1.530	39.5	1.442	39.5	1.657	39.2	1.396	39.6
948 (Av.)	1.522	40.1	1.396	40.6	1.469	41.2	1.388	40.1	1.579	39.0	1.333	40.1

S. Department of Labor

el Common Labor Rates

	Hourly wage	Per cent over 1915
	20.0	....
ary 1, 1916	22.0	10.0
1, 1916	25.0	25.0
ber 15, 1916	27.5	37.5
l, 1917	30.0	50.0
er 1, 1917	33.0	65.0
16, 1918	38.0	90.0
st 1, 1918	42.0	110.0
er 1, 1918	46.2	131.0
ary 1, 1920	50.6	153.0
16, 1921	40.5	102.5
16, 1921	37.0	85.0
st 29, 1921	30.0	50.0
mber 1, 1922	36.0	80.0
16, 1923	40.0	100.0
st, 1923	44.0	120.0
er 1, 1931	39.6	98.0
16, 1932	33.7	68.5
st 19, 1933 (NRA)	40.0	100.0
1, 1934	44.0	120.0
nber, 1936	52.5	162.0
, 1937	62.5	212.5
1941	72.5	262.5
1942	78.0	290.0
ary, 1946	96.5	392.5
1947	109.0	445.0
16, 1948	118.5	492.5
nber 1, 1950	131.0	555.0

iled by STEEL

Work Stoppages

	Number of Stoppages	Workers Involved	Man-Days Lost
(10 mos.)	5,965	4,170,000	34,850,000
	340	300,000	2,600,000
	325	515,000	7,850,000
	400	530,000	3,750,000
	550	300,000	3,150,000
	650	500,000	3,000,000
e	650	400,000	2,750,000
	650	400,000	2,900,000
	800	465,000	2,900,000
t.	800	460,000	3,500,000
	800	300,000	2,450,000
	3,606	3,030,000	50,500,000
	3,419	1,960,000	34,100,000
	3,693	2,170,000	34,600,000
	4,985	4,600,000	116,000,000
39 Av.	2,862	1,130,000	16,900,000

S. Department of Labor.

Average Wages, Hours and Employment of All Metalworking Production Workers

AVERAGE	1950*	1949	1948
HOURS PER WEEK	40.9 HOURS	39.3 HOURS	40.2 HOURS
HOURLY EARNINGS	$1.575	$1.512	$1.475
ANNUAL EMPLOYMENT	4,684,000	4,358,000	4,985,000

METALWORKING EMPLOYMENT

(All Wage and Salary Workers, in Thousands)

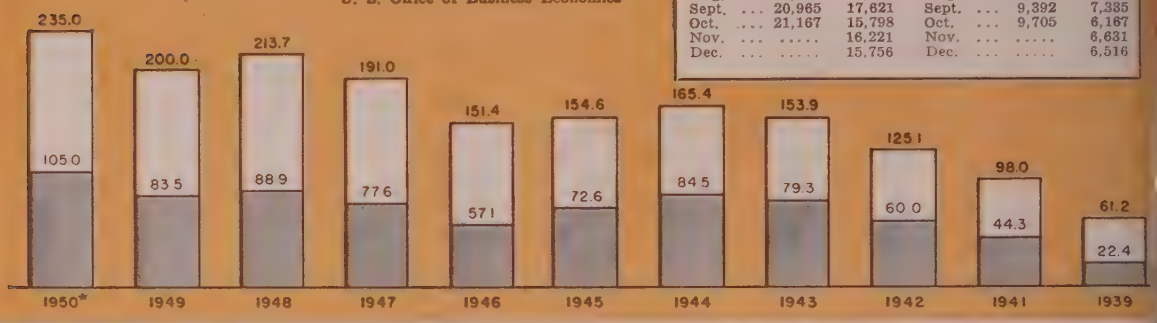
	TOTAL	Primary Metals	Fabricated Metal Products	Machinery Except Electrical	Electrical Machinery	Transportation Equip.	Instruments etc.
1950							
Jan.	5,397	1,121	846	1,238	762	1,197	233
Feb.	5,344	1,137	851	1,261	772	1,091	232
Mar.	5,403	1,144	863	1,283	779	1,100	234
Apr.	5,503	1,171	876	1,307	791	1,122	236
May	5,719	1,190	894	1,328	800	1,269	238
June	5,838	1,216	923	1,341	810	1,305	243
July	5,854	1,221	928	1,338	820	1,304	243
Aug.	6,063	1,257	973	1,366	857	1,354	256
Sept.	6,137	1,279	991	1,368	853	1,376	270
1949 (Av.)	5,480	1,101	859	1,311	759	1,212	238
1948 (Av.)	6,148	1,247	976	1,533	869	1,263	260

U. S. Department of Labor

ANNUAL SALES TOTALS

(BILLIONS OF DOLLARS)
Entire Bar=All Manufacturing Industries
Shaded Area=Durable Goods Industries

U. S. Office of Business Economics



1950-1949 By Months

(Millions of Dollars, Seasonally Adjusted)

	All Manufacturing Industries		Durable Goods Industries	
	1950	1949	1950	1949
Jan.	16,216	16,786	6,817	7,120
Feb.	16,877	17,032	7,103	7,290
Mar.	17,797	17,359	7,643	7,372
Apr.	17,206	16,609	7,488	7,029
May	19,309	16,536	8,605	6,901
June	19,838	16,831	9,030	7,154
July	20,092	16,044	8,670	6,671
Aug.	22,766	17,720	10,060	7,387
Sept.	20,965	17,621	9,392	7,335
Oct.	21,167	15,798	9,705	6,167
Nov.	.....	16,221	.....	6,631
Dec.	.....	15,756	.....	6,516

Inventories at End of Month

Millions of Dollars, Seasonally Adjusted

	All Manufacturing Industries		Durable Goods Industries	
	1950	1949	1950	1949
January	29,014	32,635	13,400	15,864
February	28,961	32,646	13,448	15,978
March	29,037	32,445	13,463	15,860
April	29,315	32,164	13,599	15,738
May	29,562	31,733	13,688	15,416
June	29,904	31,218	13,822	15,089
July	29,706	30,408	13,764	14,592
August	29,736	29,743	13,736	14,139
September	30,594	29,320	13,934	13,716
October	31,495	28,923	14,291	13,373
November	.....	28,656	.....	13,195
December	.....	28,865	.....	13,400

U. S. Office of Business Economics

Manufacturers' New Orders

Value—Millions of Dollars

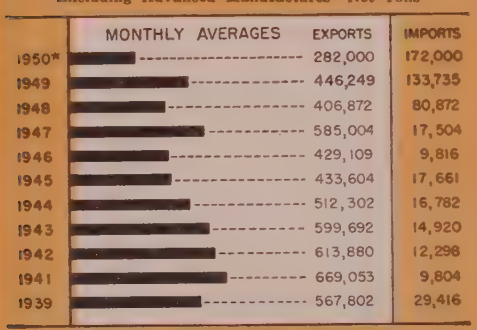
1950	Total Durables	Iron and Steel	Non-ferrous Metals	Elec. Mchy.	Other Mchy.	Transp. Equip.	Other† Durables	Total Durable 1949	Total Durable 1948
Jan.	7,479	1,892	469	793	1,211	255	2,860	6,370	6,758
Feb.	7,213	1,836	480	726	1,211	395	2,566	6,336	6,646
Mar.	8,508	2,173	488	946	1,392	266	3,243	6,840	7,609
Apr.	7,857	1,901	474	772	1,316	333	3,060	5,725	6,976
May	8,514	2,178	531	884	1,410	232	3,279	5,356	6,350
June	9,814	2,493	557	1,035	1,527	543	3,660	5,981	8,137
July	10,553	2,724	637	934	1,764	1,102	3,392	5,622	7,408
Aug.	13,863	3,277	814	1,572	2,197	1,600	4,404	6,831	7,662
Sept.	11,500	2,989	683	1,423	1,943	692	3,765	7,099	7,659
Oct.	11,994	2,883	716	1,342	2,090	831	4,132	6,892	7,634
Nov.	....	....	....	....	....	....	....	6,941	7,171
Dec.	....	....	....	....	....	....	....	6,923	7,107

†Other durables include motor vehicles and equipment, lumber, furniture, clay and glass and miscellaneous.
U. S. Office of Business Economics

IRON AND STEEL PRODUCTS

EXPORTS AND IMPORTS

Excluding Advanced Manufactures—Net Tons



1950-1949 By Months

	EXPORTS		IMPORTS	
	1950	1949	1950	1949
January	298,496	436,706	69,136	288,189
February	279,502	388,671	51,136	295,009
March	273,017	457,018	97,848	304,844
April	258,174	565,170	102,857	170,079
May	289,000	553,244	136,730	161,725
June	340,684	599,093	182,152	109,133
July	249,574	507,184	182,520	55,745
August	252,086	509,642	299,929	50,667
September	.....	521,535	.....	19,327
October	.....	255,611	.....	25,247
November	.....	187,348	.....	62,358
December	.....	373,765	.....	62,501

U. S. Office of Business Economics

Foreign Trade

Value—Millions of Dollars

	EXPORTS 1950	EXPORTS 1949	EXPORTS 1948	IMPORTS 1950	IMPORTS 1949	IMPORTS 1948
Jan.	746	1,104	1,092	623	590	545
Feb.	773	1,044	1,086	600	567	582
Mar.	868	1,177	1,139	664	633	666
Apr.	810	1,166	1,120	593	534	528
May	828	1,092	1,102	659	541	554
June	876	1,104	1,015	686	526	625
July	774	900	1,019	709	456	563
Aug.	761	883	992	819	491	606
Sept.	910	909	925	858	530	560
Oct.	...	853	1,023	...	557	601
Nov.	...	841	823	...	593	554
Dec.	...	944	1,317	...	605	720

Monthly Avera

	Exports
1950*	837
1949	1,001
1948	1,054
1947	1,278
1946	812
1945	817
1944	1,188
1943	1,080
1942	673
1941	428
1940	335
1939	265

Bureau of Foreign and Domestic Commerce

Iron and Steel Scrap

(Net Tons)

	Exports 1950	Exports 1949	Imports 1950	Imports 1949
Jan.	13,552	10,001	33,468	166,448
Feb.	14,603	10,238	3,606	199,846
Mar.	14,481	12,794	15,832	239,226
Apr.	18,151	33,247	18,408	118,839
May	18,575	52,408	21,090	127,675
June	15,719	50,866	45,220	91,838
July	14,357	23,210	26,102	52,359
Aug.	12,537	27,342	121,140	43,207
Sept.	.....	22,423	.....	5,618
Oct.	.....	20,319	.....	17,086
Nov.	.....	17,557	.....	11,924
Dec.	.....	18,189	.....	18,930

Monthly Avera

	Exports
1950*	13,500
1949	24,883
1948	20,169
1947	16,185
1946	12,425
1945	7,978
1944	7,973
1943	4,575
1942	11,811
1941	75,354
1940	263,274
1939	384,548

* Est

Businesses in Operation

(In Thousands at End of Quarter)

	Total	Contract Construction	Manufacturing	Service
Avg.)*	4,000.0	....	....	....
irst Qtr. ...	3,968.4	350.4	302.5	854.4
econd Qtr. .	.....	....	....	....
Avg.)	3,949.4	333.1	305.6	850.8
irst Qtr. ...	3,938.1	323.2	307.9	848.8
econd Qtr. .	3,948.8	332.2	305.8	849.7
hird Qtr. ..	3,957.3	337.7	306.3	852.2
ourth Qtr. .	3,953.3	339.5	302.4	852.6
Annual Averages				
... .	3,978.7	320.9	326.6	854.8
... .	3,879.0	289.3	330.5	830.5
....	3,605.4	242.6	301.9	772.8
....	3,258.4	176.7	262.8	706.0
... .	3,062.2	153.4	245.2	657.1
... .	3,045.1	157.5	238.8	625.5
... .	3,302.2	177.2	237.9	699.2
... .	3,363.6	186.8	235.3	705.8
... .	3,382.8	199.2	226.7	718.3
....	3,305.6	199.7	223.0	701.8

Office of Business Economics

ew Business Incorporations

	1950	1949	1948	1947
ry	9,070	7,906	11,000	12,112
ary	7,736	6,362	7,873	9,111
... .	9,180	7,637	9,346	10,247
....	8,375	7,273	9,223	9,802
....	9,216	7,445	8,246	9,179
....	8,861	7,260	8,550	8,922
....	7,191	6,424	7,690	9,041
st	7,201	6,828	6,723	8,055
nber	6,277	6,867	6,930	8,561
er	6,782	6,887	6,686	9,609
nber	....	6,755	6,413	7,873
nber	....	7,857	7,421	10,126
.....	....	85,491	96,101	112,638
ily Average	7,740*	7,124	8,008	9,387

& Bradstreet Inc.

Discontinued Businesses

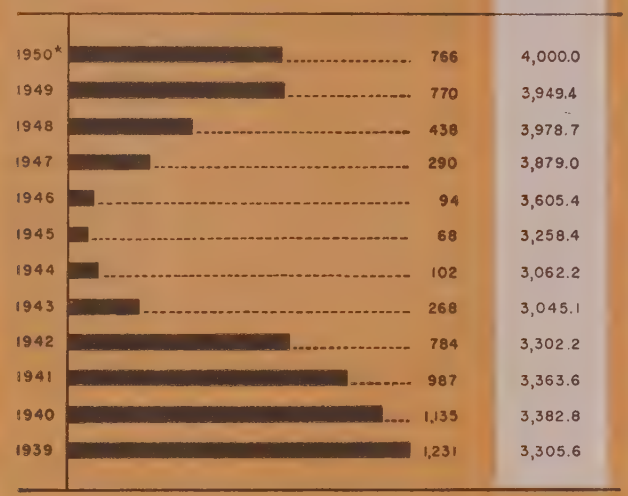
(In Thousands at End of Quarter)

	Total	Contract Construction	Manufacturing	Service
(Avg.)*	90.0	...	...	...
'irst Qtr.	92.4	11.3	10.6	18.4
econd Qtr. ..	...	...	...	...
(Avg.)	101.1	12.6	15.2	19.4
'irst Qtr.	121.6	16.6	21.0	23.2
econd Qtr. ..	109.9	11.5	17.0	22.0
'hird Qtr. ...	88.9	11.5	12.1	16.4
'ourth Qtr. ..	84.0	10.9	10.9	16.1
Annual Averages				
.....	93.4	11.2	12.4	19.7
.....	72.9	9.1	10.3	15.2
.....	56.6	6.7	7.6	12.8
.....	50.7	4.5	6.7	11.6

Office of Business Economics

BUSINESS FAILURES

Total Monthly Averages

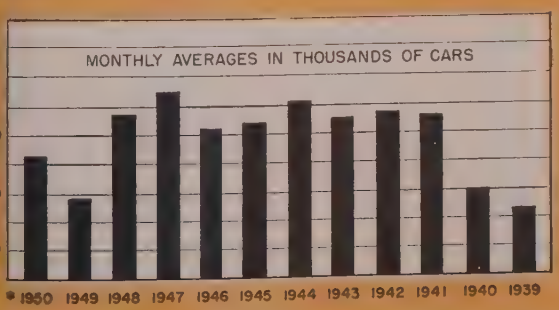


Failures—Liabilities

	FAILURES			LIABILITIES	
1950	Total	Construction	Mfg., Mining	Construction	Mfg., Mining
January	864	65	225	$1,884,000	$10,928,000
February	811	73	170	1,824,000	7,905,000
March	884	86	206	2,777,000	12,241,000
April	806	76	195	1,465,000	7,980,000
May	874	80	197	2,129,000	7,470,000
June	725	61	167	1,533,000	7,244,000
July	694	65	151	1,619,000	8,533,000
August	787	91	173	1,233,000	7,225,000
September	648	75	147	1,303,000	5,855,000
October	707	91	150	2,410,000	5,949,000
Monthly Averages					
1950*	766	..	...	.....	.....
1949	770	70	194	2,270,000	11,939,000
1948	438	37	123	1,301,000	10,858,000
1947	290	20	106	601,000	11,894,000
1946	94	12	39	362,000	3,241,000
1945	68	8	23	297,000	1,437,000
1944	102	14	29	198,000	1,681,000
1943	268	33	47	455,000	1,588,000
1942	784	62	125	853,000	2,600,000
1941	987	58	164	889,000	4,270,000
1939	1,231	54	243	919,000	5,929,000

Dun & Bradstreet Inc.

FREIGHT CARLOADINGS



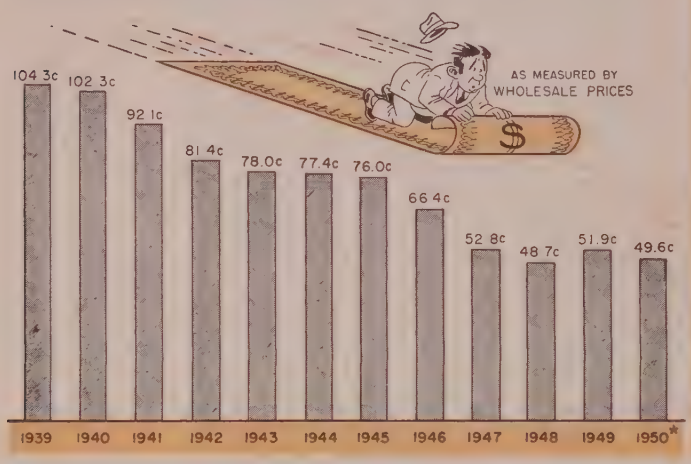
1950—By Weeks

Jan. 7	506,947	May 13 ..	716,650	Sept. 16 ..	866,207
Jan. 14 ..	631,018	May 20 ..	743,307	Sept. 23 ..	870,196
Jan. 21 ..	618,950	May 27 ..	780,959	Sept. 30 ..	879,985
Jan. 28 ..	636,415	June 3 ...	709,587	Oct. 7 ...	863,676
Feb. 4 ...	612,524	June 10 ..	795,852	Oct. 14 ..	888,559
Feb. 11 ..	568,841	June 17 ..	805,680	Oct. 21 ..	890,990
Feb. 18 ..	560,116	June 24 ..	810,152	Oct. 28 ..	887,607
Feb. 25 ..	546,791	July 1 ...	783,357	Nov. 4 ...	862,184
Mar. 4 ...	574,395	July 8 ...	553,876	Nov. 11 ..	839,612
Mar. 11 ..	707,962	July 15 ..	789,268	Nov. 18 ..	837,065
Mar. 18 ..	725,570	July 22 ..	829,884	Nov. 25 ..	701,421
Mar. 25 ..	717,233	July 29 ..	844,849	Dec. 2 ...	739,922
Apr. 1 ...	720,353	Aug. 5 ...	837,218	Dec. 9 ..	766,743
Apr. 8 ...	700,129	Aug. 12 ..	847,465	Dec. 16 ..	.....
Apr. 15 ..	707,272	Aug. 19 ..	851,025	Dec. 23 ..	.....
Apr. 22 ..	722,644	Aug. 26 ..	836,744	Dec. 30 ..	.....
Apr. 29 ..	745,350	Sept. 2 ...	852,321		
May 6 ...	744,040	Sept. 9 ...	751,276		

Association of American Railroads

*Estimated

PURCHASING POWER OF THE DOLLAR



AS MEASURED BY:

	Wholesale Prices	Consumers' Prices	Retail Food Prices
1950* ...	49.6	58.4	49.0
Jan. ..	53.1	59.9	50.9
Feb. ..	52.7	60.1	51.2
Mar. ..	52.7	59.9	50.9
Apr. ..	52.6	59.8	50.8
May ..	51.6	59.3	49.9
June ..	51.2	58.8	48.9
July ..	49.4	58.0	47.6
Aug. ..	48.3	57.8	47.8
Sept. ..	47.5	57.5	48.0
Oct. ..	47.6	57.2	47.8
Monthly Averages			
1949	51.9	59.1	49.7
1948	48.7	58.4	47.6
1947	52.8	62.8	51.5
1946	66.4	71.8	62.6
1945	76.0	77.9	71.8
1944	77.4	79.7	73.4
1943	78.0	80.9	72.4
1942	81.4	85.8	80.6
1941	92.1	95.1	94.7
1939	104.3	100.6	104.9

U. S. Office of Business Economics

National Income

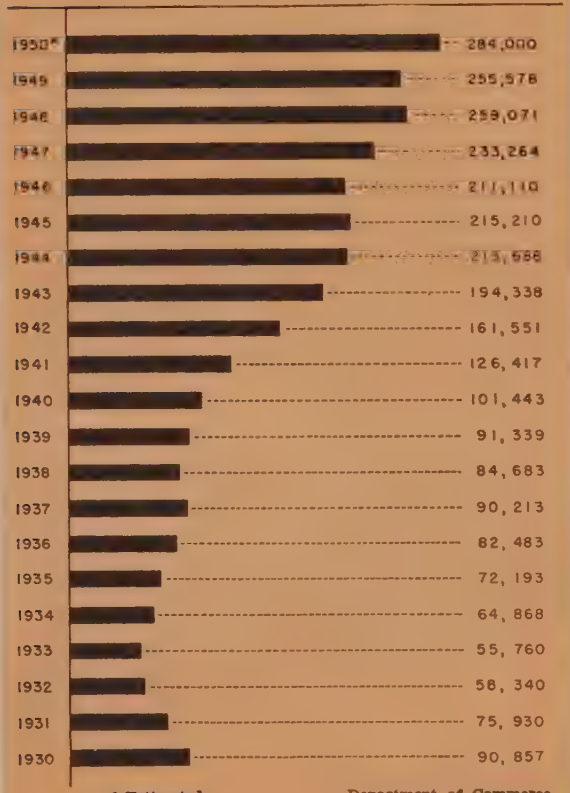
(Millions of Dollars)

1950*.	240,00
1949..	216,83
1948..	223,46
1947..	198,68
1946..	180,28
1945..	182,69
1944..	183,83
1943..	169,68
1942..	137,11
1941..	103,53
1940..	81,34
1939..	72,53
1938..	67,37
1937..	73,62
1936..	64,71
1935..	56,78
1934..	48,61
1933..	39,58
1932..	41,69
1931..	58,87
1930..	75,00
1929..	87,33

* Estimated.
Dept. of Com

GROSS NATIONAL PRODUCT OR EXPENDITURE

(Millions of Dollars)



* Estimated. Department of Commerce

U. S. Revenues, Expenditures, Debt

Year	Net Receipts 000,000	Per Capita Receipts	Expenditures 000,000	Per Capita Expenditures	Gross Debt 000,000	Per Cap De
1950....	$37,043	$244.42	$40,167	$265.03	$257,357	$169
1949....	38,246	256.68	40,057	268.83	252,770	169
1948....	44,746	306.24	36,326	248.61	252,292	172
1947....	44,703	311.77	42,505	296.44	258,376	180
1946....	43,037	305.25	65,018	461.17	269,422	191
1945....	46,456	332.78	100,404	719.25	258,682	185
1944....	44,149	319.92	93,743	679.29	201,003	145
1943....	22,281	163.25	78,182	572.83	136,696	100
1942....	12,799	95.25	32,491	241.80	72,422	53
1941....	7,607	57.29	12,774	74.16	48,961	36
1940....	5,387	44.09	9,127	70.65	42,967	32
1939....	5,164	43.21	8,765	70.65	40,445	30
1938....	5,854	47.89	7,304	59.70	37,167	28
1937....	5,028	40.93	8,281	62.69	36,427	28
1936....	4,115	32.17	9,068	69.41	33,545	26
1935....	3,800	29.88	7,583	58.00	28,701	22
1934....	3,115	24.64	6,370	56.19	27,053	21
1933....	2,079	16.54	4,325	40.91	22,538	17
1932....	2,005	16.06	4,948	41.28	19,487	15
1931....	3,190	25.70	4,091	32.99	16,801	13
1930....	4,177	33.01	3,994	32.42	16,185	13
1929....	4,033	33.19	3,848	31.67	16,931	13
1928....	4,042	33.73	3,643	30.40	17,604	14
1927....	4,129	34.94	3,493	29.56	18,510	15
1926....	3,962	33.98	3,584	30.76	19,643	16
1925....	3,780	32.91	3,529	30.73	20,516	17
1924....	4,012	35.44	3,507	30.98	21,251	18
1923....	4,007	35.93	3,697	33.15	22,349	20
1922....	4,109	37.40	3,795	34.54	22,964	20
1921....	5,625	51.98	5,538	51.18	23,976	22
1920....	6,695	62.83	6,482	60.84	24,297	22
1919....	5,152	49.07	18,523	176.40	25,482	24
1918....	3,664	35.38	12,697	122.58	12,243	11
1917....	1,124	11.00	1,978	19.36	2,975	2
1916....	782	7.77	734	7.29	1,225	1
1915....	698	7.03	761	7.66	1,191	1

Annual Statements of the Treasury

Corporate Income, Taxes, Dividends

(All Industries—Millions of Dollars)

	Income Before Taxes	Taxes†	Income After Taxes	Dividend Payments	Undistributed Income
1950§					
1st Qtr...	29,200	12,000	17,200	....	....
2nd Qtr...	37,400	15,100	22,200	....	....
1949.....	27,625	10,601	17,024	7,821	9,203
1948.....	33,880	12,969	20,911	7,467	13,444
1947.....	30,489	11,940	18,549	6,561	11,988
1946.....	23,464	9,583	13,881	5,808	8,073
1945.....	19,717	11,215	8,502	4,699	3,803
1944.....	24,333	13,525	10,808	4,680	6,128
1943.....	25,052	14,406	10,646	4,493	6,153

† Federal and state corporate income and excess profits tax liab
§ Seasonally adjusted quarterly totals at annual rates.
Department of Commerce.

Electricity Output

Millions of Kilowatt-hours

1950—By Weeks

...5,695	May13	..5,864	Sept.16	..6,449
..6,029	May20	..5,845	Sept.23	..6,457
..6,041	May27	..5,894	Sept.30	..6,503
..5,972	June3	...5,632	Oct.7	...6,514
...6,062	June10	..5,921	Oct.14	..6,509
..5,971	June17	..6,012	Oct.21	..6,506
..5,931	June24	..6,102	Oct.28	..6,563
..5,854	July1	...6,115	Nov.4	...6,551
...5,879	July8	...5,380	Nov.11	..6,574
..5,937	July15	..6,006	Nov.18	..6,728
..6,015	July22	..6,186	Nov.25	..6,508
..5,993	July29	..6,190	Dec.2	...6,716
...5,912	Aug.5	...6,247	Dec.9	...6,909
...5,898	Aug.12	..6,253	Dec.16	..6,985
..5,863	Aug.19	..6,370	Dec.23	.. ....
..5,846	Aug.26	..6,346	Dec.30	.. ....
..5,902	Sept.2	...6,459		
...5,872	Sept.9	...6,029		

TOTAL YEARLY GENERATION

by Plants Contributing to Public Supply

.321,000	1946	..223,178	1942	..185,979
..291,032	1945	..222,486	1941	..164,788
..282,698	1944	..228,189	1940	..141,837
..255,739	1943	..217,759	1939	..127,642

...n Electric Institute and Federal Power ...nission

Coke Production

Net Tons

	Oven	Beehive	Total
.....	5,357,740	103,979	5,461,719
.....	3,956,139	26,197	3,982,336
.....	4,978,608	247,881	5,226,489
.....	5,662,620	424,459	6,087,079
.....	5,868,380	449,247	6,317,627
.....	5,657,494	567,530	6,225,024
.....	5,854,975	504,591	6,359,566
.....	5,756,064	643,872	6,399,936
.....	5,671,223	587,453	6,258,676
.....	6,006,270	630,324	6,636,594
.....	.....	.....	.....
.....	.....	.....	.....

YEARLY TOTALS

	Oven	Beehive	Total
.....	67,991,844	6,345,839	74,337,683
.....	68,284,357	6,577,571	74,861,928
.....	66,758,549	6,687,301	73,445,850
.....	53,929,447	4,568,401	58,497,848
.....	62,094,288	5,213,893	67,308,181
.....	67,064,795	6,973,022	74,037,817
.....	63,742,676	7,933,387	71,676,063
.....	62,294,909	8,274,035	70,568,944
.....	58,482,422	6,704,156	65,186,578
.....	54,014,309	3,057,825	57,072,134
.....	42,882,313	1,444,328	44,326,641

Bureau of Mines

Iron and Steel Scrap

Thousands of Net Tons

	Consumption 1950	Consumption 1949	Consumers' Stocks† 1950	Consumers' Stocks† 1949
January	5,495	5,759	5,400	6,030
February	5,084	5,346	5,154	5,882
March	5,714	5,925	4,740	5,842
April	5,733	5,223	4,511	5,771
May	5,973	4,968	4,646	5,745
June	5,737	4,398	5,151	5,824
July	5,273	3,800	5,553	5,748
August	5,826	4,756	5,816	5,351
September	5,790	4,631	5,767	4,824
October	....	1,664	....	5,340
November	....	3,401	....	5,497
December	....	5,320	....	5,718

MONTHLY AVERAGES

Consumption		Consumers' Stocks†	
1950*	5,660	1950*	5,295
1949	4,599	1949	5,631
1948	5,440	1948	4,980
1947	5,072	1947	3,966
1946	4,124	1946	3,757
1945	4,683	1945	4,073
1944	5,112	1944	5,268
1943	5,138	1943	6,170
1942	5,022	1942	4,550
1941	4,934	1941	4,529
1940	3,711	1940	5,472
1939	3,027	1939	5,310

U. S. Bureau of Mines † End of month

Fuel Oil Consumption in Steel Industry

Thousands of Gallons

	Melting Furnaces	Heating, Annealing, etc.	Total
1949	1,272,367	562,930	1,835,297
1948	1,533,129	662,410	2,195,539
1947	1,511,945	655,883	2,167,828
1946	1,225,904	557,276	1,783,180
1945	1,402,527	606,130	2,008,657
1944	1,427,090	632,945	2,060,035

American Iron & Steel Institute

Fluorspar

1950—NET TONS

Qtrs.	Production	Imports	Consumption	Stocks†
1st	51,054	14,214	100,941	136,414
2nd	70,823	43,465	107,988	123,918
3rd	88,038	40,248	102,757	153,242

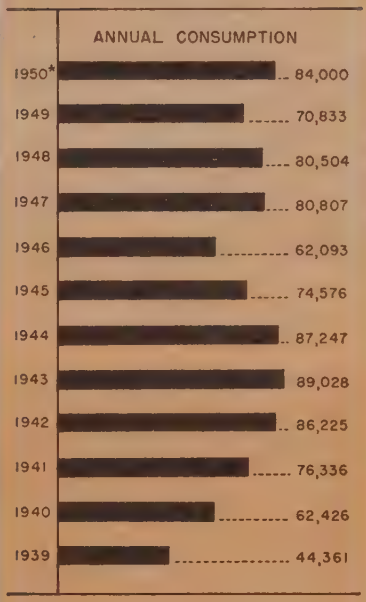
YEARLY TOTALS

	Production	Imports	Consumption	Stocks†
1949	236,400	95,619	345,221	167,660
1948	336,000	111,626	406,269	184,213
1947	343,700	78,379	376,138	147,251
1946	277,300	29,488	303,190	117,620
1945	325,200	100,726	356,090	123,011

U. S. Bureau of Mines † End of period

IRON ORE

Thousands of Gross Tons



1950-1949 By Months

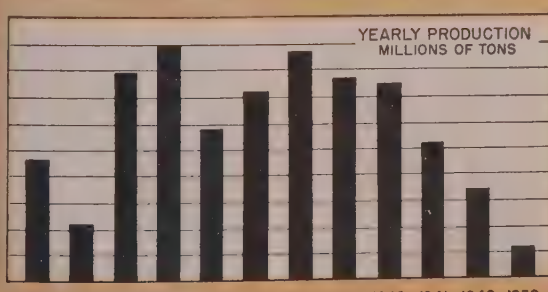
Thousands of Gross Tons—

Stocks at Lake Erie Docks and Furnaces at end of month

	Consumption 1950	Consumption 1949	—Stocks— 1950	—Stocks— 1949
Jan. ...	6,740	7,590	32,004	31,904
Feb. ...	5,329	6,992	26,745	24,981
Mar. ..	5,948	7,735	20,865	17,308
Apr. ...	7,109	7,322	14,099	17,803
May ...	7,362	7,277	14,384	21,508
June ...	7,249	6,249	19,189	27,696
July ...	7,579	5,262	24,108	35,064
Aug. ...	7,371	5,726	29,966	40,811
Sept. ..	7,175	5,565	35,716	45,356
Oct. ...	7,415	877	39,711	47,017
Nov. ...	6,861	3,520	41,543	44,786
Dec. ...	....	6,760	.....	38,629
Total	....	70,875	.....	.....

Lake Superior Iron Ore Association

BITUMINOUS COAL OUTPUT



1950—By Weeks

Millions of Tons

Jan. 7	5.6	May 6	10.8	Sept. 9	10.1
Jan. 14	7.4	May 13	10.0	Sept. 16	11.3
Jan. 21	7.3	May 20	9.6	Sept. 23	11.4
Jan. 28	7.5	May 27	10.1	Sept. 30	11.5
Feb. 4	6.5	June 3	9.3	Oct. 7	11.4
Feb. 11	2.6	June 10	10.6	Oct. 14	11.5
Feb. 18	2.4	June 17	10.4	Oct. 21	11.7
Feb. 25	2.6	June 24	10.6	Oct. 28	11.6
Mar. 4	3.1	July 1	10.2	Nov. 4	11.4
Mar. 11	13.2	July 8	1.6	Nov. 11	11.0
Mar. 18	13.4	July 15	9.1	Nov. 18	12.0
Mar. 25	12.5	July 22	11.2	Nov. 25	9.1
Apr. 1	11.9	July 29	10.8	Dec. 2	9.4
Apr. 8	11.5	Aug. 5	10.6	Dec. 9	11.4
Apr. 15	11.4	Aug. 12	10.9	Dec. 16	...
Apr. 22	11.2	Aug. 19	11.3	Dec. 23	...
Apr. 29	11.1	Aug. 26	11.0	Dec. 30	...
		Sept. 2	11.0		

U. S. Bureau of Mines * Estimated

Construction

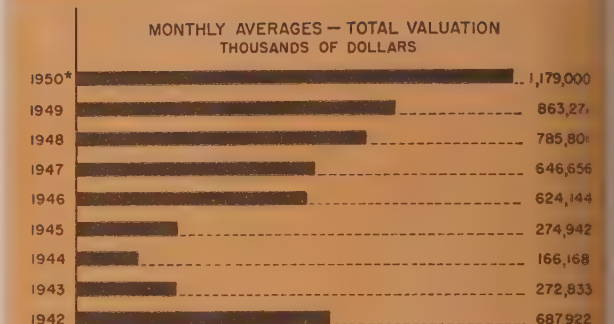
METALWORKING FACTS AND FIGURES

CONSTRUCTION VALUATION

37 States—Thousands of Dollars

	Total		Public Works, Utilities		Residential and Non-residential	
	1950	1949	1950	1949	1950	1949
Jan.	730,855	482,984	152,060	101,973	578,795	381,011
Feb.	779,530	568,467	152,511	153,499	627,019	414,968
Mar.	1,300,201	747,619	224,862	168,408	1,075,339	579,211
Apr.	1,350,496	842,586	227,041	222,391	1,123,455	620,195
May	1,347,603	880,344	264,456	213,463	1,083,147	666,881
June	1,345,463	945,676	273,416	238,963	1,072,047	706,713
July	1,420,181	943,560	257,986	252,685	1,162,195	690,875
Aug.	1,548,876	905,748	253,781	234,283	1,295,095	671,465
Sept.	1,286,541	1,093,724	238,231	223,129	1,048,310	870,595
Oct.	1,135,815	1,061,751	179,128	203,964	956,687	857,787
Nov.	1,087,062	957,761	155,486	256,423	931,576	701,338
Dec.	929,030	722,256	206,774	241,792	722,256	480,464
Total	10,359,250	7,883,295	2,475,955	2,340,751	7,883,295	5,542,544

F. W. Dodge Corp.

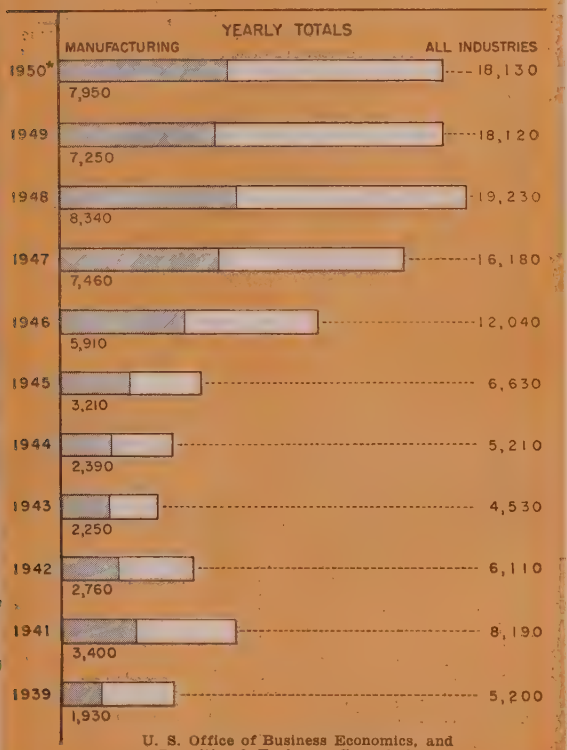


NEW PLANT AND EQUIPMENT EXPENDITURES

Millions of Dollars

(Figures are rounded and will not necessarily add to totals)

	Manufacturing		All Industries	
	1950	1949	1950	1949
1st Quarter	1,520	1,850	3,700	4,460
2nd Quarter	1,860	1,880	4,330	4,660
3rd Quarter	2,050	1,690	4,690	4,370
4th Quarter	2,520	1,830	5,410	4,630
Total	7,950	7,250	18,130	18,120



U. S. Office of Business Economics, and Securities & Exchange Commission

New Houses Started

(Permanent Nonfarm Dwellings—Cost Estimated in Thousands of Dollars)

	Number		Cost	
	1950	1949	1950	1949
January	78,700	50,000	$589,997	$374,026
February	82,900	50,400	637,753	382,778
March	117,300	69,400	934,886	530,438
April	133,400	88,300	1,093,920	666,968
May	149,100	95,400	1,233,672	733,967
June	144,300	95,500	1,236,566	719,701
July	144,400	96,100	1,225,970	710,341
August	141,000	99,000	1,240,321	743,388
September	115,000	102,900	.....	768,373
October	103,000	104,300	.....	776,674
November	85,000	95,500	.....	723,093
December	.....	78,300	.....	573,232
Total	1,379,000*	1,025,100	.....	$7,702,971

Yearly Totals

	Number	Cost		Number	Cost
1950*	1,382,000	$	1946	670,500	3,769,767
1949	1,025,100	7,702,971	1944	141,800	495,054
1948	931,600	7,203,119	1941	706,100	2,825,895
1947	849,000	5,642,798	1933	93,000	285,446

U. S. Bureau of Labor Statistics

Fabricated Structural Steel

Orders placed—Tons

	1950	1949	1948
Jan.	119,317	130,418	160,634
Feb.	117,664	108,764	130,119
Mar.	189,420	149,079	213,123
Apr.	155,011	98,802	154,082
May	192,319	116,975	141,764
June	266,612	96,952	162,367
July	272,745	126,255	177,687
Aug.	259,212	98,953	172,485
Sept.	251,054	120,373	180,422
Oct.	233,922	158,593	162,739
Nov.	.....	103,557	140,794
Dec.	.....	124,251	169,553
Total	1,432,972	1,965,769	

Yearly Totals

1949	1,432,972
1948	1,965,769
1947	1,628,756
1946	1,726,057
1945	1,392,608
1944	786,096
1943	707,480
1942	1,762,453
1941	2,296,954
1940	1,748,144
1939	1,305,048
1938	1,256,638
1937	1,628,641
1929	3,597,825

American Institute of Steel Construction

Industrial Building Cost Index

(1914=100)

	1950	1949	1948	1947	1946
First Quarter	305	319	310	304	258
Second Quarter	313	313	325	300	270
Third Quarter	330	307	327	304	287
Fourth Quarter	...	307	323	307	300

Monthly Averages

1950*... 321	1947... 304	1944... 227	1941... 208	1938... 191
1949... 311	1946... 279	1943... 225	1940... 193	1937... 199
1948... 321	1945... 236	1942... 223	1939... 190	1936... 184

Aberthaw Co.

*Estimated.

Men of Industry

kers Inc., Detroit, division of Sperry Corp., ap- nted **R. E. Esch** general sales manager. He was lustrial products sales manager and has been with kers for 17 years.

wser Inc., Ft. Wayne, Ind., announcing the change name of its refrigeration division to Bowser Tech- al Refrigeration with offices and plant in Terry- le, Conn., reports the following appointment of icers: **Stephen V. Zavoico**, president; **Thomas J. piccolo**, vice president in charge of sales; **Jack amroth**, vice president in charge of production; **Dr. hn Gelb**, chief engineer; and **James Scibetta**, treas- er and secretary.

ganization changes at **General Motors Corp.**, De- oit, following resignation of **M. E. Coyle** as an ex- utive vice president and a director, include: **Louis Goad** who succeeds Mr. Coyle as executive vice esident in charge of the car and truck group, body d assembly divisions group, and the accessory oup. He is a director and member of the opera- ons policy and administration committees. Elected director and member of these committees is **John F. ordon**, formerly Cadillac general manager and since ly vice president in charge of the corporation's en- neering staff. He is succeeded in the latter position **Charles A. Chayne**, formerly chief engineer of uick. **Verner P. Mathews** succeeds Mr. Chayne at uick. Mr. Gordon succeeds Mr. Goad as group ex- utive in charge of Fisher Body, Ternstedt and uick-Oldsmobile-Pontiac Assembly Division. New rectors and members of the operations policy com- ittee are **C. H. Kindl**, **H. J. Klingler**, and **C. R. sborn**. Mr. Klingler, GM vice president and general anager, Pontiac Division, was named group ex- utive in charge of passenger car and truck divisions. herwood E. Skinner, GM vice president and general anager, Oldsmobile Division, becomes group execu- ve, accessories divisions, to succeed **F. L. Burke**, n leave of absence. **Jack F. Wolfrom**, Oldsmobile

R. E. ESCH
. . . Vickers gen. sales-mgr.

STEPHEN V. ZAVOICO
. . . Bowser president

chief engineer, is now general manager. **H. C. Alexander**, a director, was elected to the financial policy committee.

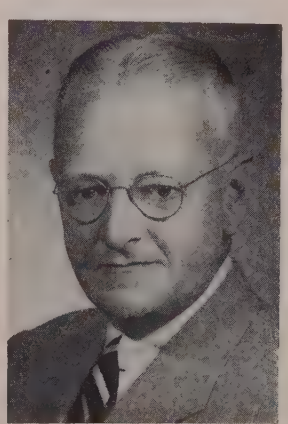
New executive officers for **D. J. Murray Mfg. Co.**, Wausau, Wis., are: **A. W. Plier**, executive vice president and general manager; **D. J. Everest**, vice president; **C. L. Durkee**, director, vice president and sales manager; **W. A. Marquardt**, secretary; **P. W. Hoeper**, assistant secretary; and **Grover Keeth**, assistant treasurer.

Charles H. Besly & Co., Chicago manufacturer of taps, twist drills and reamers, and grinding machinery, appointed **Ellis C. Wester** as sales manager of its cutting tool division, and **Hal Seger**, manager of drill and reamer sales.

I. R. Walker, since 1932 manager of the Birmingham saw division of **R. Hoe & Co. Inc.**, was made general manager of the company's saw division, with headquarters in New York. **E. J. Williamson**, former Pa-

LOUIS C. GOAD

JOHN F. GORDON



CHARLES A. CHAYNE

HARRY J. KLINGLER

. . . step up in General Motors Corp.'s executive organization

MEN OF INDUSTRY

WILBUR R. LEOPOLD
. . . Worthington ass't to V. P.

EMMERT F. HARCHELROAD
. . . Universal's plant mgr.

JAMES S. BAILEY
. . . Carpenter ass't to V. P.

cific Coast manager, becomes manager at Birmingham.

Wilbur R. Leopold was appointed assistant to Vice President **T. Cruthers** of **Worthington Pump & Machinery Corp.,** Harrison, N. J., and will function on public works projects. Mr. Leopold was manager of Worthington's Detroit office, and is succeeded by **Clarence S. Wentworth,** associated with the company since 1922, and since 1948 general line salesman in Chicago. **J. J. Thompson** was named manager of the company's sales personnel and training division.

J. J. Carlson, assistant general sales manager, **Kaiser Steel Corp.,** Oakland, Calif., was promoted to general sales manager. He joined Kaiser Steel in 1944 after several years with Inland Steel Co.

J. Calvin Lee was appointed district sales manager at Cincinnati for **Columbia Chemical Division,** Pittsburgh Plate Glass Co. He succeeds **Martin Low,** retired. The Cincinnati headquarters have been moved to 3903 Carew Tower.

L. M. Jander was appointed sales manager, industrial division, **Henry Disston & Sons Inc.,** Philadelphia, manufacturer of saws, tools, files and special steels. Mr. Jander succeeds **J. F. Wilkinson** who has resigned to enter his own industrial distributing business in Miami, Fla.

George H. Loving was appointed director of sales, explosives department, **E. I. du Pont de Nemours & Co. Inc.,** Wilmington, Del. He succeeds **Charles B. McCoy,** transferred to the electrochemicals department as assistant general manager.

John C. McGunnigal was appointed sales manager, steel strapping division, **Stanley Works,** New Britain, Conn. He formerly was general sales manager of Brainard Steel Co.

Hunt-Spiller Mfg. Corp., Boston, placed **J. William Schaeffer** in charge of foundry production scheduling. With the company since 1936, he formerly headed its standards section.

Emmert F. Harchelroad was appointed to succeed **Roy L. Slocum,** retired, as manager of the Universal, Pa., plant of U. S. Steel Corp.'s **Universal Atlas Cement Co. Richard M. Kelley** was promoted to assistant plant manager, and succeeds Mr. Harchelroad in that position.

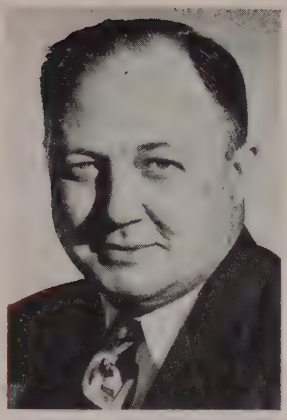
James S. Bailey was named assistant to the vice president of sales, **Carpenter Steel Co.,** Reading, Pa. He will devote his time to special work. Formerly sales manager for the Cleveland district he is succeeded in that position by **Harold R. Potter,** who will make his headquarters in Cleveland. Mr. Bailey joined the company in 1928 as sales engineer in Cleveland and in 1941 was appointed district sales manager in that territory. Mr. Potter started with the company in 1943 as sales engineer in Cleveland.

Newly elected officers of the **Electric Industrial Truck Association** for 1951 are: **C. B. Cook,** president, and **Elmer F. Twyman,** vice president. **William Van C. Brandt,** the association's managing director, was re-elected secretary and treasurer. Mr. Cook, vice president and export sales manager, Elwell-Parker Electric Co., Cleveland, succeeds **M. W. Heinritz,** vice president, Gould-National Batteries Inc. Mr. Twyman, vice president in charge of the Philadelphia division of

C. B. COOK

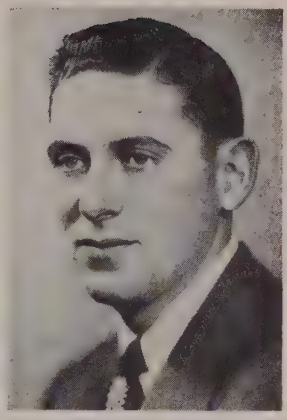
ELMER F. TWYMAN
. . . Electric Industrial Truck Assoc. officers

MEN OF INDUSTRY



H. M. SWITZER
. . . Switzer Mfg. president

R. S. ROELLER
. . . Pennsalt supervisor

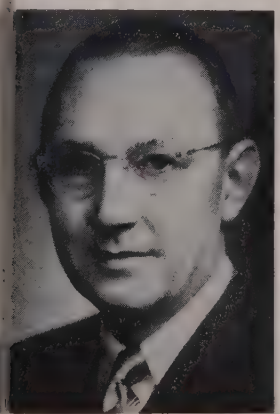


LESTER CROWN
. . . Marblehead V. P.

le & Towne Mfg. Co., succeeds **M. W. Meddick,** vice sident and sales manager at Elwell-Parker.

M. Switzer Mfg. Co. Inc. has been organized as a tal manufacturer with factory and general offices New Albany, Ind. **H. M. Switzer** is president. He a former vice president of Leeson Steel Products c., and remains an officer and director of that com- ny. On the board of directors, in addition to Mr. itzer, are: **George T. Stevens,** president of Leeson; **alter Coyle,** automobile dealer; **Herbert Money,** vice esident, Artcraft Mfg. Corp., Lima, O.; and **Richard Connor,** attorney, who is also secretary of the cor- ration. The new company has acquired manufac- ring rights to a new type refillable liquid dispenser d an automatic electric clock refrigerator defroster.

fficers of **Baldwin-Lima-Hamilton Corp.,** Cincinnati, e: **Marvin W. Smith,** president, **George A. Rent- hler,** chairman of the board; **Walter A. Rentschler,** ce president in charge of Lima-Hamilton Division; **. A. Byerlein, H. F. Barnhart** and **C. T. Ziegler,** ce presidents, Lima-Hamilton Division; **W. R. Par- all,** general controller; **Perry A. White,** controller, ima-Hamilton Division; **J. R. Connaughton,** assistant cretary; and **J. W. Llewellyn** and **Orin Greiwe,** ssistant treasurers.



MARVIN W. SMITH

GEORGE A. RENTSCHLER
. . . Baldwin-Lima-Hamilton president and chairman

Pennsylvania Salt Mfg. Co., Philadelphia, has placed its six sales departments under the supervision of two assistant general sales managers. Appointed to these newly created positions and reporting directly to **William P. Drake,** vice president and general sales manager, are: **R. S. Roeller,** who has general supervision of agricultural chemicals, heavy chemicals and special chemicals departments, and **Arthur G. Tunstall Jr.,** who supervises the B-K and household products, laundry and dry cleaning and maintenance chemicals departments. Before assignment to his new position Mr. Roeller was sales manager of the heavy chemicals department, and he will continue in that capacity.

Lester Crown was elected vice president and chemical engineer of **Marblehead Lime Co.,** Chicago. He received his degree in chemical engineering from Northwestern University in 1946 and following graduation taught in Northwestern's School of Engineering. Later he graduated from Harvard Graduate School of Business Administration.

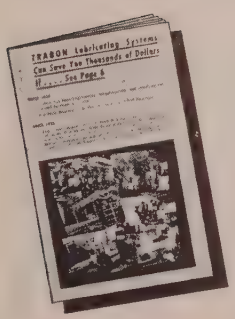
Hanna Furnace Corp., Ecorse, Mich., merchant pig iron division of **National Steel Corp.,** appointed **Sherman B. Burke** as its Buffalo district sales manager. He will continue to supervise the Boston office pending appointment of a successor there.

Ernest B. Meynard was appointed assistant sales manager, **Buckeye Tools Corp.,** Dayton, O. He has served the company since 1942 in various sales and service capacities.

J. S. Johnson was appointed assistant to the president of **United States Rubber Co.,** New York. He succeeds **G. R. McNear,** who was elected a director and managing director of North British Rubber Co. Ltd., Edinburgh, Scotland, in which U. S. Rubber is a stockholder. Mr. Johnson has been on the general manager's staff in the tire division for several years. **Wilbur E. Combs** was appointed product manager for the L. H. Gilmer Division, and will have headquarters at the Gilmer plant in Tacony, Philadelphia. He was formerly assistant manager of V-belt sales for the company.

Trabon

KEEPS YOUR PRODUCTION LINES MOVING



Backed by 20 years of experience in engineering and installing lubricating equipment, Trabon can save you thousands of dollars. Write for this booklet which shows how it can be done.

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OIL AND GREASE SYSTEMS

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1814 East 40th Street • Cleveland 3, Ohio

1951

Technical Forum

...on Progress in Metalworking

NARROWING profit margins, pinched by higher labor and material costs, by threats of price control and stifling taxes, by confusing allocations and restrictions of materials, throw a heavy load on the ingenuity of U. S. engineers, process specialists and equipment designers. How can it best be shouldered? What have been the accomplishments of 1950 which point the way for 1951? Here are views of 173 experts over the entire field of metal production, fabrication, handling and finishing who have responded to STEEL'S request for a summation of what they believe to be the most important technical milestones.

Metallurgy ..... p. 158
Heat Treating .... p. 162
Metal Production .. p. 168
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Forging & Forming . p. 203
Machining ..... p. 211
Surface Treatment .. p. 233
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Materials Handling . p. 247
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Metallurgy

- **WHAT to do about critical material shortages is high on the metallurgist's agenda for 1951. Substitution of one metal for another, one alloy for another; use of clad materials, special coatings, revised analyses—all demand careful scrutiny.**

- **TITANIUM now can be drawn into wire about as easily as 18-8 steel and is available in sizes down to 0.003-inch. Phase diagrams have been determined for titanium-silicon, titanium-molybdenum and titanium-columbium.**

- **COPPER shortage focuses attention on plain aging of cold-worked brasses and bronzes at pre-recrystallization temperatures, yielding 30-50 per cent increase in strength to permit comparable reductions in section.**

- **DESCALING of stainless steel wire by the sodium hydride process is superseding other cleaning methods, especially for rods.**

- **EXCEPTIONAL shock resistance, at both room and elevated temperatures, of a chrome-molybdenum-silicon-vanadium steel makes it a natural for many applications. One: Cutter shanks in automatic coal mining machines.**

- **CODE rules governing design and fabrication of pressure vessels do not yet include provisions which make possible economical use of low-alloy high-strength steels.**

- **CAST vs wrought gas turbine blades continues controversial. Design experience with this type of engine eventually may moderate extreme temperature peaks and ease the problem of blade metal selection.**

- **ZIRCONIUM is seen at the turning point to a promising future, both as a metal and alloying agent for ferrous and nonferrous materials. Avidity for gases makes it useful in electronic tube manufacture.**

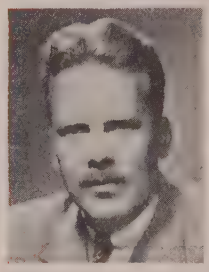
Studies Reveal New Methods Of Processing Nonmagnetics

JOHN F. KLEMENT

Chief metallurgist, Ampco Metal Inc., Milwaukee: "The armed services now have need for a high strength nonmagnetic material which can be used for a number of applications such as gears, shafting, bushings, housings and structural parts. Bronzes of high strength, particularly aluminum bronzes with special additions, show remarkable properties so far as low magnetic permeability is concerned. The permeability on some of these alloys has been as low as 1.00005. These same alloys have a wide range of physical properties that are controlled by the amount of aluminum present. Heat treatments are employed on some to increase such properties as yield strength and hardness.

"In the bronze casting field a cast-to-size product is being made in special sand core molds, and also in cement molds. Aluminum bronze lends itself rather well to close tolerance and smooth finish on castings up to several hundred pounds in size. In steel mills, cast-to-size slippers of aluminum bronze with a tolerance of 1/32-inch have, for the most part, eliminated the need for expensive and time-consuming machining.

"Experimental work is now being conducted on the possibilities of centrifugally casting base tube that will be tube reduced and cold drawn into bourdon gage stock. In the past all base tube has been made by extrusion, which is costly because of low yields and high salvage costs. The centrifugally cast method may be the answer to manufacturing a cheaper beryllium copper bourdon tube."



Hydrogen Research Helps Increase Steel Ductility

CARL A. ZAPFFE

Consulting metallurgist, Baltimore, Md.: "Before the ASTM annual meeting in June, and the ASM meeting in October, 1950, discovery of a new heat-treating phenomenon was announced, resulting from four years of work on gas-metal systems conducted under the Office of Naval Research.

"Just as acids dissociate in pickling operations to produce hydrogen in a form soluble in steel, it was discovered that steam reacts similarly at elevated temperatures, such as encountered in heat-treating operations, to liberate sufficient hydrogen to cause important loss of ductility, at least in steels of hardenable types—carbon, alloy, stainless.

"Atmospheres of pure steam showed greatly increased impairment of ductility; and carefully dried atmospheres provided the interesting information that most steels actually have a ductility considerably exceeding that found in ordinary practice.

"Since most heat-treating furnaces contain moisture from humidity, and particularly as a reaction product of fuel combustion, many steels so treated are being fabricated under an unnecessary handicap. Greater die reductions, more passes between annealing operations, increased freedom in such operations as cold upsetting—a great area of such improvements is now open by this identification of the important action of steam in supplying hydrogen to the metal. Innumerable other

fields are also open, such as the importance of this hydrogenizing effect upon flake-sensitive steels, heat-treated cast irons, stock for hydrogen-sensitive enameling and electroplating operations.

"Thermodynamic theory developed at the start of the research predicted these results by defining the 'hydrogen potential.' Each metal reacting with steam develops its own 'hydrogen potential,' which is a measure of the driving force of the gas for entry into the steel. One atmosphere of steam will put as much hydrogen into ingot iron as one atmosphere of hydrogen gas; and for most alloy steels steam is as effective as tens or hundreds of atmospheres pressure of pure hydrogen gas. For magnesium and aluminum, the 'hydrogen potential' is in the neighborhood of millions of atmospheres, which accounts for the fact that these metals must be degassed before casting in order to prevent porosity."

Continuous Brass Mills Impractical for British

J. G. THOMPSON

Chief, division of metallurgy, U. S. Department of Commerce, National Bureau of Standards, Washington: "In the field of metal working, a subject of outstanding interest to British nonferrous metallurgists is the new continuous brass mill of Scovill Manufacturing Co. at Waterbury, Conn., as evidenced by the extended discussion of Hofen and Mulvey's paper on this topic at the 1950 Autumn meeting of the British Institute of Metals. However, it was pointed out that many of the British brass plants are too small, and their operations are too diversified, to make large continuous mills generally applicable to the British brass industry.

"It was interesting to find that the same discussions and controversies, concerning metallurgical research, are in progress in England as in the United States. For example, the questions of basic research on pure and monocrystalline metals versus 'practical' studies of commercial metals and alloys, the mechanism of creep and fatigue, polygonization, diffusion in metals and what to do about corrosion of metals, have not been settled in England any more than they have in this country."

Research in Metallurgy More Varied During 1950

R. H. HARRINGTON

Research associate in metallurgy, Knolls Research Laboratory, General Electric Co., Schenectady, N. Y.: "Metallurgical research during 1950 showed a wider variety of subject matter than in the recent past with almost an equal balance between ferrous and nonferrous fields. Chief fields of research were the following: Surface phenomena, including metal-gas reactions, Al coating on steel, oxidation of stainless steel at high temperature, oxidation of pure iron, Mo plating, and carbonitrided case-hardening.

"Others concerned high temperature effects, including the sigma phase in high Cr steels, long time tests of Cr-Mo steels, Ni-Al-Mo alloys at high temperature, austenitizing, graphitization in steels, and high temperature effects versus stress-rupture, fatigue, creep and oxidation. Alloy constitution, including the ternary systems of Cr-Mo-Fe and In-Cd-Zn, solidus temperatures in Mg alloys, Zr-Fe alloys, the properties of Mg-Li and Ni-Fe and of Al-alloys, and the metallurgy of Ti and its alloys with Fe, Co and Ni. Fracture, deformation and annealing, including the deformation and annealing of Zn, studies of single crystals of Zn-Ag and Al, fractures of ferrite and Fe-Si crystals and the recrystallization and annealing textures of Cu, Fe-Ni, Ti and Fe-Si. Metallurgy of magnets, including basic study of the structure of permanent magnet alloys and the specific disorder to order reaction in the new Co-Pt alloy.

"In addition there were the long time perennial subjects of plasticity, diffusion and the heat treatments of steels. It is interesting to note that the current shortage of Cu supply is focusing attention on the value of plain aging of cold-worked brasses and bronzes at pre-recrystallization temperatures, such treatments resulting in 30 to 50 per cent increase in their useful load carrying capacities so that present operating parts, made of these cold-worked alloys can, in many instances, be reduced in cross-section area by 30 to 50 per cent if they are correctly aged."

Titanium Wire Can Be Drawn Similarly to 18-8 Stainless

HENRY C. BOYNTON

Consulting metallurgist, Research Institute of Temple University, Philadelphia: "Today's trend is ever toward larger hot-rolled rod bundles, rolled at higher speeds; one new mill rolls 60 tons per hour at a speed of 156 miles per hour. Manufacturers who have no facilities for rolling the large bundles are welding small ones. Grinding to remove defects in the rods' surface is in vogue but is not too satisfactory.

"Although acid cleaning of hot rolled rods has always been a messy, smelly necessity with the accompanying hydrogen brittleness, yet there is a distinct trend to the omission of the cleaning of patented carbon and alloy steel. In fact for many years there has been untireless effort to get rid of the dusty, hygroscopic lime coat on rods and wire, substituting a self-lubricating rust resisting coating on the wire as drawn. Incidentally, Swedish wire rods are back in this country and as always are claimed to be superior and more uniform and 'fatigue resisting' especially for music wire and springs. This claim may be a moot question.

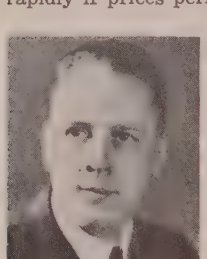
"Stainless steel wire is being descaled more often by the sodium hydride process which is rapidly superseding other stainless cleaning methods especially for rods. Stainless 18-8 recorder wire—once a curiosity—is now practically standard for wire recording; but it has to be manufactured under the closest of quality control as to chemical and magnetic properties. A new brand of stainless, plus aluminum and carbon can be worked while soft and 'precipitation hardened' after working at low temperatures.

"A new strong copper-nickel wire of 70 per cent conductivity is on the market, also a copper base alloy of 60 per cent conductivity which has superior 'fatigue' qualities and does not 'season crack.'

"An aluminum alloy wire which never needs painting or repairs in the form of fencing is now available; in

fact all forms of aluminum wire are steadily increasing in use.

"Titanium metal formerly announced at $5.00 per pound is now being produced by several manufacturers and will soon—we hope—be much cheaper, for as wire, it can be drawn about as easily as 18-8 and is now available in sizes down to 0.003-inch. In salt atmosphere, titanium wire is practically corrosionless and on account of its specific gravity of 4.5 (between aluminum and iron) and strength its uses are many. Zirconium also has a great future; it is plentiful in the earth's crust and has many desirable properties such as corrosion resistance—as a 'gas-go-getter' in electronics so that its future is rosy. It is also claimed that 1 per cent Zr in magnesium will form an alloy with excellent hot extrusion properties. Like titanium, its uses will grow rapidly if prices permit."



Vessel Fabricators Use Low Alloy High Strength Steels

FRED L. PLUMMER

Director of engineering, Hammond Iron Works, Warren, Pa.: "Fabricators and erectors of large storage vessels have, in the past, generally used mild steels conforming to ASTM Spec. A283. Recently Standards 12C of the American Petroleum Institute have been modified to permit the use of low alloy—high strength steels meeting the requirements of ASTM A242 or SAE 950. The rules permit the use of a basic design stress equal to 60 per cent of the specified minimum yield point (usually 45,000 to 50,000 psi for these steels). Thus the design stress in tension equals from 27,000 to 30,000 psi as compared to 21,000 psi used for the mild steels.

"Code rules governing the design and fabrication of pressure vessels do not yet include provisions which make possible the economical use of these low alloy-high strength steels, many of which have been developed and made available under special trade names by individual steel manufacturers.

"The steel manufacturers have prepared extensive test data covering welding characteristics, physical properties and service records for these steels. In many cases it seems probable that welded vessels constructed of these steels might have significantly better service characteristics than those constructed of mild steels, when operated at the lower atmospheric temperatures.

"The fabrication division of the Pressure Vessel Research Committee is now planning a program of tests selected to assist code-making groups in arriving at suitable rules for the sale and economical use of these high strength steels."

Diversified Steels Make Production Savings

C. L. CLARK

Metallurgical engineer, special steel developments, Steel and Tube Division, Timken Roller Bearing Co., Canton, O.: "As is often the case, steels originally developed for a particular application can be used to good advantage in others, at considerable savings in one form or other to the user.

"A chrome-molybdenum-silicon-vanadium steel, known commercially as Timken 17-22A is an example of such diversified use. While it was originally developed as a high temperature bolting steel for service at temperatures to 1000° F, certain other characteristics of this steel and its lower carbon modification, Timken 17-22A(S) have extended its application to other fields.

"This analysis is outstanding in its resistance to shock at both room and elevated temperatures, even in a highly hardened condition, to thermal stress cracking, and has sufficient strength to resist hot upsetting under rapidly applied stresses at extreme temperatures. As a result of its room temperature properties it is finding wide use in those applications where shock resistance is important, such as for cutter shanks in automatic coal mining machines.

"As a result of its outstanding resistance to thermal stress cracking and hot upsetting, two of the large manufacturers of brake disks for aircraft have standardized on the 17-22A(S) steel for their more severe applications. In large high-speed airplanes, temperatures of the order of 1700° F and higher are often encountered during braking and most steels fail either by stress cracking or hot upsetting.

"These 17-22A steels also have the maximum high temperature strength of any of the low alloyed steels and are finding use in different types of war equipment in which high temperatures and high stress must be withstood for relatively short periods of time, as in various parts of jet planes. The ability of these low alloy steels to function in these applications is of very great value, insofar as the important conservation of critical alloys is concerned."

Fabricators' Scheduling Still Big Headache

EVERETT C. GOSNELL

Vice president and manager Chemical & Process Equipment Division, Colonial Iron Works Co., Cleveland: "With advent of the critical material procurement situation, serious fabrication problems have developed. Conservation of critical materials, particularly those containing columbium and nickel, is essential. Substitution of other grades of austenitic stainless steels for the columbium stabilized grades (types 347 and 318) is necessary for all except very special essential applications. Types 321 and the ELC grades of types 304 and 316 have been substituted for types 347 and 318 quite extensively, with satisfactory results. Care must be exercised in welding procedures and electrode selection. In some cases, stabilization heat treatment is specified even with ELC grades of stainless and thus distortion problems may be encountered, must be anticipated and corrected.

"Two obvious methods of conservation of critical materials is through use of clad steels or lining of steel equipment with solid corrosion-resistant sheet. Fabrication and welding procedures for clad steels have been developed for quality fabrication by producers and fabricators who regularly handle these materials. New techniques in lining application have been developed particularly for plug welding which may be required in connection with equipment for pressure and vacuum. Properly installed linings in new equipment are giving satisfactory service. This type of fabrication has regularly been use for the more expensive corrosion-resistant alloys, such as Hastelloys. In many cases the correspond-

clad steels are not commercially available. Installation of corrosion-resistant linings in existing equipment presents even greater fabrication problems and should be considered only as a last resort.

In heating and cooling applications, external jackets can in many cases be substituted for internal coils of corrosion-resistant materials, redesign work being required. Internal parts such as agitator assemblies, formerly of solid corrosion-resistant materials, have been satisfactorily and economically fabricated of steel sheathed or covered with corrosion-resistant materials. Ingenuity is required in design and fabrication procedures.

"Delay in obtaining component fabricated parts of equipment together with extended overall deliveries of materials have caused larger fabricators to carefully analyze their own plant equipment and its limitations, and to install additional facilities. Heads, shapes, coils, flanges, return bends, can now be made in several of the larger fabricators' own shops and thus are not dependent upon either outside labor or upon production conditions."

Gas Turbine Performance Improved by Better Design

C. A. CRAWFORD

Development and Research Division, International Nickel Co. Inc., New York: "As experience has been gained in manufacturing gas turbine engines, it has been possible to utilize metals to better advantage. This has been accomplished by eliminating extreme peaks of temperature through design. The demand for more power without proportionate increase in size and weight of engines has forced movement in the opposite direction, namely, toward higher average temperatures which may be tolerated by the materials used provided destructive peaks of temperature do not occur.

"Most improvement in gas turbine performance has thus been achieved by better design and the same materials that were in use last year continue to be accepted as the best available. There has been a growth of knowledge as to the effects of thermal shock and vibration on components operated at red heat. Metallurgists have not been wholly idle and have been able to improve the quality of accepted materials through refinements in melting and mill practice. There have been no outstanding new alloys offered and any changes that have appeared constitute improvements on existing alloys.

"The merits and advantages of castings versus wrought turbine blades are still debated with equal earnestness by the advocates of each type."

New Application Found For Cold Drawn Wire

HOWARD J. GODFREY

Assistant chief engineer, John A. Roebling's Sons Co., Trenton, N. J.: "One of the most interesting topics of the wire industry during 1950 was the development and use of a high tensile-strength cold drawn wire for prestressed concrete construction. Although this type of wire has been used in Europe in the past, the physical properties of the American product exceed those of the European-type by a considerable degree.

"Economic factors relating to prestressed concrete construction techniques make it necessary to supply a large diameter wire. The important physical characteristics of the wire for prestressed concrete are the tensile strength and elasticity. The largest diameter wire, 0.276-inch, which corresponds to the European 7 millimeter diameter, has a minimum tensile strength of 240,000 psi and a minimum proportional limit of 125,000 psi. This high proportional limit of the cold drawn wire was obtained by a stress-relieving treatment performed after drawing.

"Another important requisite for prestressed concrete wire is a high-creep limit. Creep properties of structural materials are generally associated with high temperature service. Working stresses used in prestressed concrete, however, are of such magnitude that ordinary wire will not sustain the high loads without creeping. The minimum creep limit stress of the American product is 125,000 psi. At this stress the wire is stable and the amount of creep under constant load has been found to be negligible.

"In addition to its physical characteristics, the wire is sufficiently straightened so that it can be handled in the field without difficulty. The straightening is obtained by stress-relieving rather than by mechanical means.

"The first prestressed concrete bridge in United States using high tensile wire is nearing completion in Philadelphia; it is known as the Walnut Lane bridge."

Military Uses Push Titanium Development

R. A. LUBKER

Assistant chairman, metals research, Armour Research Foundation of Illinois Institute of Technology, Chicago: "Volume of metallurgical research at Armour jumped from $598,000 in 1949 to $706,000 in 1950, an increase of 18 per cent.

"Forty projects were handled during the year, of which twenty-nine were for industrial concerns and eleven for government agencies. Research on titanium has been emphasized in view of its advantage to the military. The titanium-silicon, titanium-molybdenum and titanium-columbium phase diagrams have recently been determined.

"There has been work started on additional systems and the phase transformation involved in heat treating alloys. Since the potential applications for titanium have far outstripped current metal sources, greatest emphasis is being placed on development of economical methods for producing the metal in quantity.

"Considerable research is also under way on materials of present or potential use to the defense effort, including a study on alloy steels under impact loading, possibility of utilizing silicon and vanadium base alloys in view of their availability, development of high temperature thermocouples, welding aluminum by recrystallization techniques and a fundamental study on stress corrosion cracking of aircraft alloys. Other projects of importance to the defense effort include research on improved welding, heat treating and foundry processes, and development of superior abrasion resistant alloys for specific applications.

"Two domestic substitutes for palm oil utilized in hot dip tinning have been developed to overcome its high cost and scarcity during war."

Heat Treating

- **AUSTEMPERING** and martempering, once metallurgical curiosa, now are widely accepted heat treating methods, licking many a problem in control of warpage and distortion.

- **CYCLIC** annealing of forgings, adapted to mass production operations by a large automotive company, has brought major savings in machining costs; its application must be related carefully to forge shop layout and production rates.

- **SALT BATHS** of the hot caustic type now are used for removal of burned-in sand from castings, lubricants from steel stampings, carbonaceous material from tire molds, and paints and enamels from steel.

- **INTEGRATED** heat treating lines—continuous hardening furnace, quench tank, washer and draw furnace—are the rule in many new installations, frequently in a closed circuit to permit one operator to load and unload.

- **"AUTOMATION"** is moving into the field of heat treating equipment, with specialized devices for automatic cycling, charging, quenching and discharging.

- **NITROGEN-HYDROGEN** atmosphere generator for use in large-scale coil annealing operations is showing some slick results in terms of keeping the steel surface clean.

- **GAS** carburizing, with its many advantages, still is not foolproof; such factors as temperature uniformity, gas circulation, gas composition and furnace tightness need watching.

Heat Treating Equipment Becoming More Automatic

W. H. HOLCROFT

Executive vice president, Holcroft & Co., Detroit: "During the past year 'automation' has become more important than ever in the design of heat treating equipment. Industry is demanding closer quality control, more involved heat treating cycles, and installations requiring minimum floor space and including furnaces with optional modes of quenching.

"To meet these demands modern furnace design not only features automatic cycling but also automatic charging, quenching and discharging. Although this considerably simplifies the furnace operator's job it likewise considerably increases the complexity of the furnace designer's work. With the additional problem of recently developed material shortages, importance of proper engineering of heat treating equipment has become more pronounced than ever before.

"Today heat treating furnaces often incorporate more mechanical motions than machine tools. Furthermore, these motions must take place at temperatures of 1600-2000° F and in many instances in the presence of a gas atmosphere of controlled composition.

"Complexity of the problems presented by 'automation' re-emphasizes the need for experienced furnace engineering personnel. Industry is setting higher and higher specification limits in order to improve its product; furnace designers must meet these demands.

"In many instances, for example, the process of carbonitriding, the furnace engineer is called upon to delve into a field in which there is limited theoretical understanding, and produce equipment capable of performing a job better than it was ever done before. Success in situations of this type shows that experience pays off."

Proper Heat Treatment Helps Minimize Alloy Loss

A. E. CARPENTER

Chairman of the board, E. F. Houghton & Co., Philadelphia: "History is repeating itself in the return to lean alloy steels, made necessary by shortage of nickel and other alloying elements. Metal parts manufacturers are searching for ways to use the old NE grades and still meet strict specifications prescribed for yield and tensile strength.

"Fortunately the method of heat treating these steels can be made to compensate for some of the loss of alloying elements. This has been found possible by users of the 4100 and 4300 series for such parts as aircraft landing gear forgings, merely by a change to a more speedy quenching oil. Such oils are available, having a fast rate of quenching through the critical zone and thus providing greater strength to meet rigid specifications.

"Difference between present-day shortages and those which the metal industry confronted early in World War II is that the substitutes then worked out are today about as scarce as the original materials. For example, molybdenum, substituted for tungsten in high-speed steel eight years ago, is itself a scarce item today, due largely to stockpiling by Government edict.

"Another example is the material used in black oxide

ings which were developed early in World War II to ace cadmium, chrome and nickel finishes. Fortunately, te coatings are still available although somewhat more ricted than they were in the previous period. Manu- urers are turning to substitutes for the metallic coat- and are again showing much interest in the process controlled oxidation for a black impervious coating ch will not cause dimensional changes nor encourage her oxidation under normal exposure."

Armor Plate Flame-Softening Gaining Wider Acceptance

W. B. SHARAV

Development engineer, Linde Air Products Co., New York: "It is not usual procedure to use the same tool to obtain two results, opposite in character. By heating a piece of hardened steel with an acetylene flame to just below the critical temperature, dened steel is tempered or drawn and left in a soft- d condition. This application is finding increased use industry.

In production, flame-softening of oxyacetylene cut es of armor plate is gaining wider acceptance. Any -hardening steel and some of the quench-hardening els are left with a fully hard edge along the line of . Before machining can be done, this layer of hard terial must be removed or softened. Passage of a ting head, of correct design and burning the cor- t amount of acetylene and oxygen, over this surface l soften the steel down to the machinable range.

'Another quite common use of this process is the me-softening of the ends of chain link pins. Link s of both small and large sizes are flame-softened in tomatic machines at high production rates. The flame- tened end is easily riveted over when assembling the ain."

Cyclic Annealing Arousing Interest Among Forgers

WILLIAM ADAM, JR.

Vice president, Ajax Electric Co. Inc., Philadelphia: "A significant trend in heat treating is the concern of metallurgists and process engineers over the control of distortion or warpage. Their concern s to do with costly finish machining or grinding op- ations on hardened work. By exercising more control heat treating and reducing distortion, important sav- gs are effected by eliminating or greatly reducing final ishing operations.

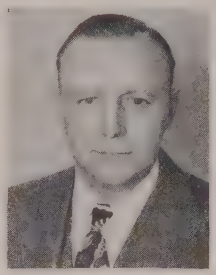
"This accounts for the ever-increasing adoption of mar- mpering and austempering—heat treating techniques pecially designed to control distortion.

"The pioneer work of Ford Motor Co. in adopting elic annealing of forgings on a mass production basis s generated intense interest throughout the forging dustry. This process, whereby the residual heat in the rgings coming from the presses or hammers is utilized y quenching directly into a low temperature salt bath, ffers amazing economic advantages. The forgings are nnealed in less than one-tenth the time normally re- quired; shot blasting and pickling are eliminated and the machinability of the forgings greatly improved due to the more uniform grain structure.

"Other companies have now adopted the process and it should be in wide use in the near future. One deterrent is the present layout of most forging shops. Cyclic annealing, by its very nature, demands that the salt bath furnace be placed adjacent to the presses in order to receive the hot forgings.

"Salt bath brazing is now competing with other established brazing methods, especially for quantity production items. It offers speed and economy as well as greatly reduced floor space for a given production. The process consists of assembling the parts with the brazing alloy in place and then immersing the assembly in the salt bath for a predetermined time, then quenching or slowly cooling in air. Carburizing or hardening is often done simultaneously with the brazing operation.

"Wide use of salt baths for descaling stainless and alloy steels has led to their use for other surface cleaning operations including the removal of burnt-in sand from castings, lubricants from steel stampings, carbonaceous materials from process molds used in the rubber industry and stripping paint or enamels from steel stampings."



Marquenching Will Hold Distortion To Minimum

T. A. FRISCHMAN

Chief metallurgist, Axle Division, Eaton Manufacturing Co., Cleveland: "On the increase is the adaptation of hot oil or hot salt quenching (marquenching) to carburized and hardened work. Several different plants operating on a large volume basis are already employing this type of quench for this kind of work. Others are giving it serious consideration and are making provisions in new furnace installations for changeover to the method when desired. Reports from different sources tell of distortion being held to extremely low limits as compared with conventional oil quenching.

"Another development in its ascendancy again is dry-cyaniding, or carbo-nitriding, as it is also called. For a while in the early 1940's it attracted some attention, but interest rather died out during World War II. Now, it is becoming popular again to the extent that furnaces are being designed and built specifically for the purpose of using this treatment for light case work where speed, uniformity and clean work are demanded."

Furnace Innovations Since 1945 Should Be Studied

MATTHEW H. MAWHINNEY

Consulting engineer, Salem, O.: "In their capacity as suppliers to industry, builders of industrial heating furnaces follow a course which is guided by industry's requirements, and current interest is again in the heat treatment of armor plate and ordnance. This development should call for a careful appraisal of the furnaces so hastily improvised for these purposes in the last war, to determine the good and bad features of those many different furnace designs. Also, with the fate of most of that equipment so fresh in mind, the desirability of some attempt at standardization and disposition of such

equipment between rearmament of the nation should be considered.

"Many innovations and developments in the short peace-time interval since 1945 are available for adaptation to new shell lines and other war-time installations under consideration. These include improvements in woven wire furnace conveyor belts, unusually large rotary furnaces with a history of successful high-temperature operation established, mechanical handling machines to reduce laborious and wasteful manual charging and unloading of shell forging blanks from heating furnaces, successful adaptation of radiant tube firing and protective atmospheres to rotary furnaces for heat treating, high-temperature radiant tube firing with refractory tubes, and further development and technical progress in the application of high speed heating burners.

"Increased interest and demand for continuous forging and heat treating furnaces for items of unusual size can be expected to spur further application of mechanical handling to these processes."

Carbon Control for Gas Carburizing Impressive

HOWARD E. BOYER

Chief metallurgist, American Bosch Corp., Springfield, Mass.: "To us who are interested in heat treating as well as other phases of the metalworking trade, the National Metal Congress marks the end of a fiscal year in progress. Since progress is always a matter of evolution, the progress noted in a single year is seldom phenomenal, though the 1950 metals exposition held in Chicago revealed at least a full year's measure of advancement.

"One of the more outstanding developments in the heat treating field introduced at the exposition was the simplified means of carbon control for gas carburizing. This control can also be applied to neutral hardening, carbon restoration, annealing or even controlled decarburizing since an equilibrium can be established between the atmosphere and the surface of the work at any desired carbon content in the range of 0.15 to 1.25 per cent carbon. Other improvements were also evident in controlled atmospheres.

"The submerged electrode salt bath, although not exactly new has undergone further development and is lending itself to a wider range of application. It is becoming increasingly popular as an economical means of heating steel for forging as well as for cyclic annealing forgings directly from the hammers so that their heat is not lost."

Flame-Hardening Camshafts At Rate of 1000 Daily

H. V. INSKEEP

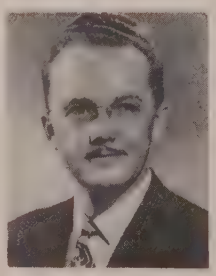
Development engineer, Linde Air Products Co., New York: "Present trend of the flame-hardening process is to extend the scope of automatic operation by designing and building machines to harden larger and more complicated mechanical parts. Flame-hardening is a process which uses heat from oxy-fuel gas flames to selectively heat a portion of the surface of a machine part and, combined with immediate quenching, produces hardened surfaces where needed. This process is compatible with mechanized control and operation. Some machine tool builders have developed both standard and special machines to harden a great variety of machine components.

"An outstanding example of this trend in building machines to harden more complicated parts is the flame hardening of automotive engine camshafts. Fully automatic machines are now operating, each one capable of hardening nearly 1000 camshafts per day. All valve cams and the fuel pump cam are hardened simultaneously.

"Hardening of gasoline and diesel engine crankshafts has long been known to increase bearing life. Cost of hardening and low production rates have prevented general acceptance of this practice in the automotive field. However, industry can confidently expect the development of machines which will be capable of flame-hardening all the crank pin bearings on an eight- or six-cylinder engine shaft in one operation. The simultaneous flame-hardening of all crank and main bearings of a crankshaft, is an easy next step.

"Extension of the hardened case from the ends of the straight section of the bearing to include the fillets will increase fatigue resistance of a crankshaft at the fillet section. In this manner a given crankshaft can be made suitable for an engine of increased horsepower.

"Development of equipment for controlling the flow and mixing of oxygen and fuel gas at the correct rate and in the proper ratios has kept pace and in some instances has preceded the needs of these automatic machines. Suitable regulators are available to handle the large gas flows at the proper operating pressure. Blowpipes of large capacity with extremely stable operating characteristics have been on the market for several years."



Induction-Welded Conduit Produced at 200 FPM

H. B. OSBORN JR.

Technical director, Tocco Division, Ohio Crankshaft Co., Cleveland: "Three most significant advantages made in the further adaptation of high-frequency induction heating to the metalworking field have been along the lines of automatic forging equipment, welding, and vacuum melting.

"With emphasis being placed on cost cutting and economy in production generally we have found it necessary to develop automatic equipment for forging. The following examples serve to illustrate the point: A strip of magnetic material is heated progressively as it passes through a specially-designed induction heating setup and feeds through and under a press which automatically stamps out cylindrical magnetic cores for telephone hand sets. Bars are fed progressively through an induction coil, heated to forging temperature, automatically sheared, the hot slug transferred to a press or upsetter and a completely forged part discharged.

"Induction heating is being used not only for butt welding of cylindrical sections but continuous welding of pipe and tubing. Installations are now in operation producing conduit at the rate of 200 feet a minute.

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"Advantages of induction heating are elimination of the stitching effect associated with resistance heating thereby doing away with speed limitations. A tube can be welded just as fast as it can be formed and cut off. How fast? One-thousand feet a minute can be produced, if necessary.

"The field of vacuum metallurgy is becoming more and more important especially in the production of special alloys and for undisclosed work for the Atomic Energy Commission."

Integrated Heat Treating Lines Now the Rule

E. G. deCORIOLIS

Director of research, Surface Combustion Corp., Toledo, O.: "Producers of sheet and strip steel are watching with intense interest the application of the new nitrogen-hydrogen atmosphere generator to large scale coil annealing operations. Quality of the annealed stock produced with this atmosphere has been setting new high standards in terms of cleanliness of the annealed steel.

"This nitrogen-hydrogen atmosphere is practically free of carbonaceous material. It is also virtually free of oxygen. Since this atmosphere gas is reducing at all temperatures, steel of high surface quality is consistently and readily obtained.

"Tin plate stock annealed in such an atmosphere will be entirely free from carbon deposition or oxidation. This has been conclusively demonstrated in actual operations and checked by accepted accelerated tests. The annealed stock is so bright and clean that, after electrolytically plating, tin plate is said to be equal in quality to tin plate obtained by hot dipping. This atmosphere can be used to provide stock for other plating applications where top surface quality sheets are required.

"Savings of cratical tin and zinc afforded by this operation are particularly significant in view of the present shortages of these materials. When tin and zinc become more plentiful, the process should offer interesting competitive advantages to tin plate and galvanizing stock mills."

Many Factors Influence Quality Gas Carburizing

T. L. COUNIHAN

Chief metallurgist, Hyatt Bearings Division, General Motors Corp., Harrison, N. J.: "Carburizing of steel has been practiced for many years. Within the last two decades the use of hydrocarbon gases for carburizing has increased greatly. These have many advantages over solid carburizing mediums. They are by no means foolproof and many details must be followed to produce quality work. Besides temperature uniformity, such factors as gas circulation, gas composition, and tightness of the furnace are extremely important.

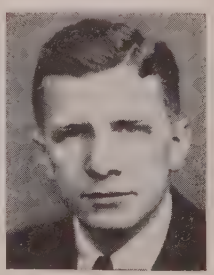
"In the rotary-type of carburizing furnace it is not possible to check work temperature for an entire car burizing cycle with a sizable work load in the furnac while the retort rotates, as the checking thermocouple will soon be damaged and destroyed by the movin charge.

"Particular attention should be given to the tempera ture of the work near the discharge end of the rotar furnace. It is here that the temperature may be lowe than otherwise expected, with resulting shallowness i case depth.

"To determine carburizing uniformity of a rotary fu nace it is well at frequent intervals to check case dept by no less than ninety samples from a furnace hea These specimens should be selected so one-third a taken from the front portion of the load, a second thir from the center, and a last third from the rear of t furnace. If there is temperature non-uniformity it w usually show up in a check of this proportion.

"Gas circulation plays a great part in successful ca burizing. This is particularly true in the pit-type ca burizing furnace. A fan to circulate carburizing gas is a requisite for satisfactory carburizing in a furna of this type.

"Gas composition is such a complex subject that can be but scarcely mentioned in a brief article. T use of cracked or carrier gases enriched with sm amounts of raw gas are of distinct advantage towar obtaining good carburizing conditions. Control of wat vapor in the carburizing gases is of extreme importan and is too often not given proper emphasis. A differen in the amount of water vapor in a carburizing gas c mean the difference between good and poor carburizi results."



New Atmosphere Increases Annealed Stock Quality

WILLARD ROTH

Industrial heating engine Westinghouse Electric Corp., Mea ville, Pa.: "Integrated heat tre ing lines, involving a continuo hardening furnace, quench ta washer and draw furnace are coming the rule. The furnace builder engineers and stalls the entire line, along with its material handli equipment. More often than not, the line is a closed c cuit, so that one operator loads and removes work. Su lines are adaptable to conventional heat treating, c cyaniding, carburizing, recarburizing, etc. The latter i radiant tube heated, either electrically or by gas, pending upon conditions.

"Continuous controlled-atmosphere cycle annealing f naces are making major savings in forging machin costs. Flexibility built into such furnaces permits cy variations to obtain best machinability of each of various alloy steels used. Elimination of scale throu atmosphere control reduces tool wear; close control the metallography permits faster machining.

"Continuous furnace lines for small parts dese mention. We are currently building a continuous li 500 to 800 pounds per hour capacity, which will rec burize and dry cyanide roller and automotive tim chain pins and links. It will include oil quench, 2-st washing, and draw furnace. All units will be gas fi Case depth will be variable from 0.015-inch in rec burizing to 0.0005-inch in dry cyaniding. The line be fed from a hopper through a vibratory feeder."

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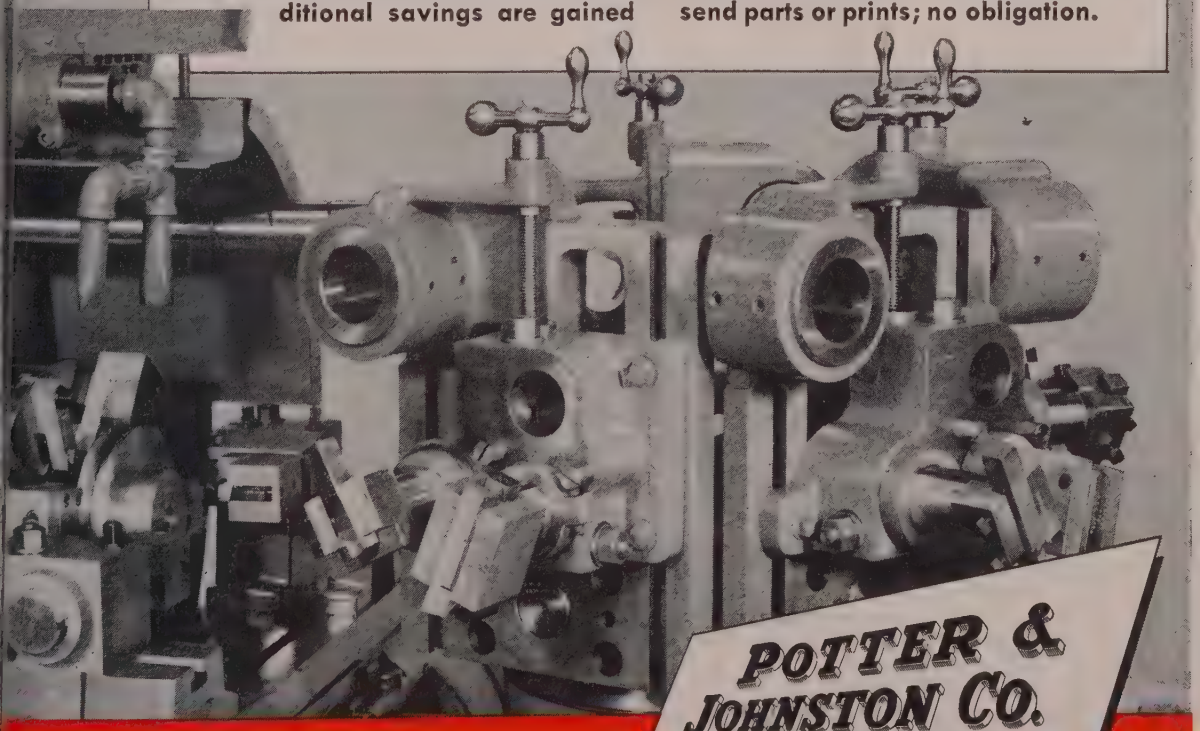

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Metal Production

- 125 MILLION tons of steel annually by 1970? That would take 140 million tons of ore and to meet such an ambitious schedule would require completion of new large taconite processing plants, more railroads, freighters and ore handling equipment.

- TACONITE concentration is being intensified by all producers who see half of the Lake Superior iron units coming from this rock in 15-20 years.

- COMPETITIVE positions of the electric furnace and open hearth are growing tighter and, actually, if sufficient power is available, operating cost of an electric shop is only half that of an open-hearth plant of the same capacity.

- STAINLESS steel powder, handled by standard techniques, after compressing, coining and sintering will show tensiles up to 90,000 psi and elongations up to 40 per cent.

- COKE oven construction has boomed to the point where supplies of oven brick may limit future building schedules. Coke is seen in short supply for years to come.

- PRODUCTION of nodular iron by magnesium treatment is expected to increase fivefold yearly as new applications start to snowball.

- TWO new tool steels—a 5 per cent chromium type and a chromium-manganese-molybdenum analysis—neither requiring the use of a high-temperature furnace for hardening, are receiving increasing attention.

- BLAST FURNACE operators are not of a single mind on whether high top pressure is beneficial or not; there are strong adherents and there are those who are unimpressed.

- CARBON hearths now are installed on about a third of the nation's blast furnaces and despite a few scattered break-outs, for which corrective measures were devised, appear destined to find further acceptance.

Annual Iron Ore Tonnage To Reach 140 Million in 1970

E. W. DAVIS

Director, Mines Experiment Station, University of Minnesota, Minneapolis: "The iron ore producing industry is preparing for an important change in operations. For the past six years something like three-quarters of the iron ore used in the United States has come from the Lake Superior area but it is now evident that most of the operating companies must develop new sources of ore. From present indications these new developments will be in foreign areas and in the Lake Superior taconite districts. The foreign source will be largely high grade, direct shipping ore. Lake Superior taconite is the low grade, iron-bearing formation from which the high grade ores were formed. However, high grade ore can be made from taconite by rather elaborate processing methods.

"If the recently announced program is followed to produce 125 million tons of steel annually by 1970, we are going to need all the ore we are going to get from every source. It is estimated that this program will call for over 140 million tons of iron ore annually by 1970. To meet this schedule will mean the completion of several large Lake Superior taconite processing plants and also construction of new railroads, boats and ore handling equipment to make the foreign ores available. It is estimated that the cost of providing an ample supply of iron ore for the future will be between $1 and $2 billion.

"Important foreign sources of ore now being exploited are Venezuela, Labrador and Liberia. It is interesting to note that the steel companies working most energetically in developing foreign sources are the same companies most interested in the Lake Superior iron formations. They, apparently, are planning to draw ore from both sources."

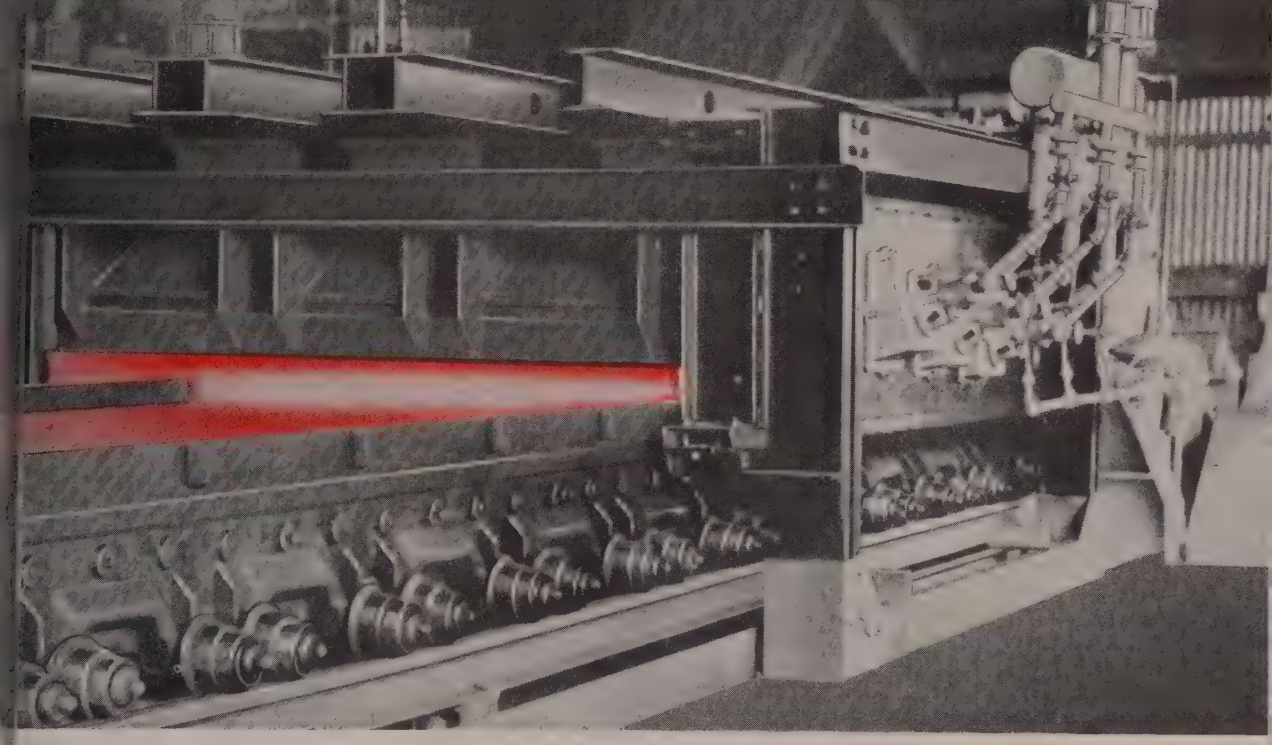
Special Cements Prolong Life of Firebrick Lining

C. E. BALES

President, Ironton Fire Brick Co., Ironton, O.: "The refractories industry is again being called upon to aid in the defense of our nation. This time Washington officials realize the vital importance of refractories in the production of iron and steel, coke, chemicals, power, aluminum, magnesium and practically every other item used for defense or war purposes.

"There is no reconversion problem. Fortunately the manufacturers of refractories have long realized that without an adequate supply of good fire brick our nation would be helpless in times of stress from aggressor nations. The refractories industry has kept pace with new developments in the metallurgical industries, our plants have been kept in excellent condition, and several important new plants have been built. However, the industry is now running at virtual capacity and a shortage of refractories will develop if the projected expansion in iron, steel and by-product coke capacity is to go ahead promptly.

"During the past year, many steel mills have increased their use of refractory cements in all types of furnaces and these special cements have actually prolonged fir



S McKEE IGNITION FURNACE *improves* PHYSICAL ROPERTIES OF SINTER....

AUSE we are primarily engineers and contractors—not equipment nufacturers—we can select the *best available equipment*, regardless of or installation in McKee-designed sintering plants.

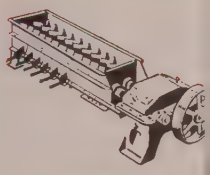
ome cases it has been necessary to design new equipment because satis- equipment was not otherwise available. Ample ignition is essential to sinter of correct physical properties. No previous furnace provided t ignition to meet McKee specifications for sinter quality.

furnace, with an 84-inch ignition bed and six burners, assures thorough of the charge. Burners are placed in an angular position to direct the nto the materials. They can be operated individually or in any combina- compensate for variations in moisture content of the charge. Use of all ners permits a quick starting up period.

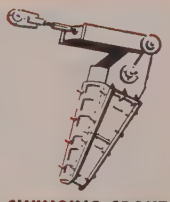
burner can be removed for maintenance without shutting down the . The arches of the furnace are easily replaced without disturbing burner isms. No special brick shapes are required.

McKee Ignition Furnace is the *best equipment available* today.

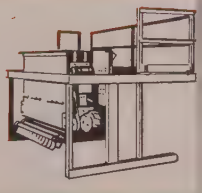
Other exclusive McKee equipment developed to meet definite needs in Sintering Plants:



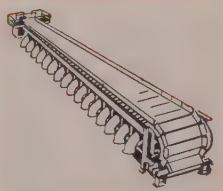
PUG MILLS



SWINGING SPOUT



AERATING FEED HOPPE



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brick lining life. The foundry industry has received great benefits from special ramming and plastic type refractories for front slagging spouts, ladle linings, cupola patching, etc.

"In the by-product coke industry, many plants have found that use of special fire clay paving brick gives better service on oven battery tops and for patching coke wharves than regular red or mill pavers. This is due to the fire clay brick being more resistant to spalling and at the same time offering high resistance to abrasion. In recent months, this same type paver has been used successfully in front of open hearth furnaces."

Beryllium Copper Alloys Get Heavy-Duty Assignments

N. W. BASS

Assistant vice president, Brush Beryllium Co., Cleveland: "1950 was a year of intense activity and unprecedented demand in the beryllium industry, particularly with reference to the beryllium copper alloys. Use of both wrought and cast alloy products was well in excess of the 1949 level, indicating the wide acceptance of these heat-treatable, high-strength, high-conductivity alloys.

"Beryllium copper strip was in great demand for use in heavy-duty and precision mechanical applications in springs, clips, contacts, switch blades, pressure responsive diaphragms. Aircraft, submarine and automobile builders used considerable beryllium copper rod for various components. Beryllium copper castings in substantial quantities were used as dies for molding plastics, heavy-duty switchgear, low-sparking safety tools, precision castings and diamond drill bits.

"The 5 per cent beryllium aluminum master alloy was in strong demand by aluminum and magnesium foundries because of the great inhibiting effect of beryllium (as low as 0.006 per cent) on the inflammability and oxidation of magnesium. It also acts as a grain-refiner in aluminum castings. Some interesting experimental work is being done on beryllium additions to aluminum in cladding steels. Beryllium permits the use of a thinner aluminum clad layer and also improves its ductility and corrosion resistance."

Oxygen Effects Economies In Lead Blast Furnaces

ROBERT L. ZIEGFELD

Secretary, Lead Industries Association, New York: "The new vacuum de-zincing process for removing traces of zinc from refined lead has proven itself highly effective. The process recovers over 90 per cent of the zinc content left in the lead after desilverization and, incidentally, almost 100 per cent of cadmium present.

"A new softening process for elimination of antimony and arsenic from lead bullion, developed in Australia, has been put into operation at a large American lead smelter. It is continuous and permits a marked reduction not only in the operational cost of batch methods heretofore used, but also in space and equipment requirements. Additional facilities are currently under construction.

"Woolen bags used almost exclusively in the past to recover fumes and dust have given way in some phases of the secondary lead refining industry to venturi scrubbers. Operated for sometime on a pilot plant basis the scrubbers have now been installed on a full scale basis and it is reported operate at an average dust removal efficiency in the range of 91 to 95 per cent.

"Use of oxygen enriched air blast in lead blast furnaces has shown considerable savings in coke and much steadier furnace operation. Comparison of furnaces using about 22 per cent oxygen in the blast with furnaces using no oxygen showed a coke saving of about 42 per cent. Corresponding production increases were reported of anywhere from 15 to 30 per cent."

O. H. Bath Size To Exceed 300 Tons Before 1960

H. W. POTTER

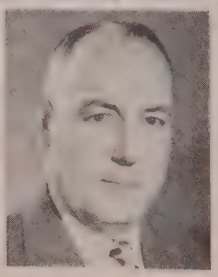
Senior technical assistant, open hearth dept., Lukens Steel Co., Coatesville, Pa.: "From observations of present trends in open hearth design and practice, it appears that for furnaces operating on the conventional scrap and pig iron process the following changes may occur: Basic size of all new furnaces for new hot metal shops will exceed 300 tons of ingots before 1960.

"End design will be improved. Relative size of uptakes on old and new furnaces will be reduced. Positive furnace pressure will be increased. Air infiltration will be cut to a minimum. The above improvements will largely offset rising fuel costs.

"Mechanical means will be provided for charging bulk materials and scrap in much larger containers or chutes to reduce charging time. Open front or three-door furnaces will be necessary to accommodate the new charging methods.

"Improved quality of basic brick will result in more extensive use of this refractory. Most plants will find it economical to build their own oxygen plants.

"Electric furnaces will replace small cold metal open hearths for making carbon steels."



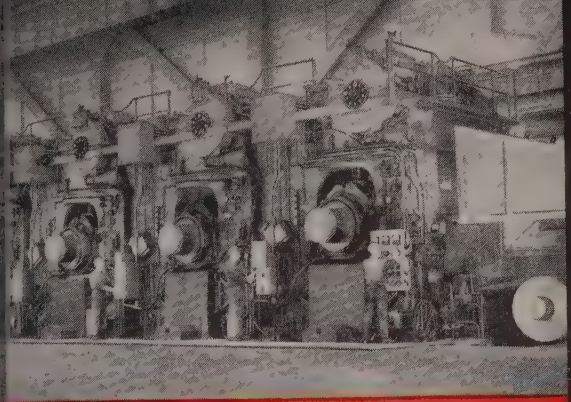
War Threat Calls for New Ordnance Metallurgy

JOHN K. KILLMER

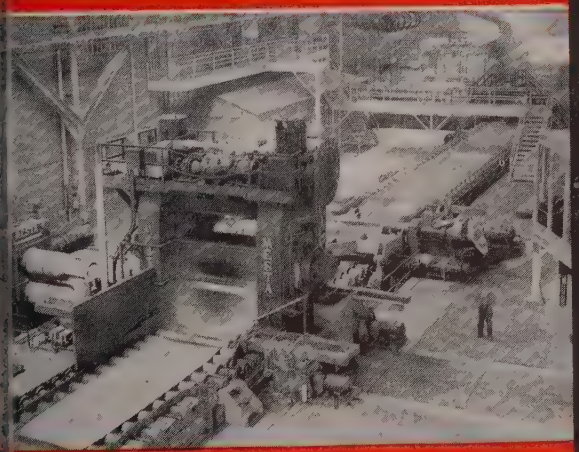
Metallurgical engineer, Bethlehem Steel Co., Bethlehem, Pa.: "About a year before Pearl Harbor production of steel for the ordnance program began on a large scale. Confusion existed at the time due to misinterpretation of existing government specifications.

"There were variations in the type and grades required for different ordnance components and there was a general lack of knowledge on the part of both contractors and steel producers regarding metallurgical quality characteristics required in the finished component. By the middle of 1942, through efforts of ordnance integrating committees, these misunderstandings were largely resolved. The cooperative study of mutual problems contributed largely to the outstanding record of steel production for the war effort.

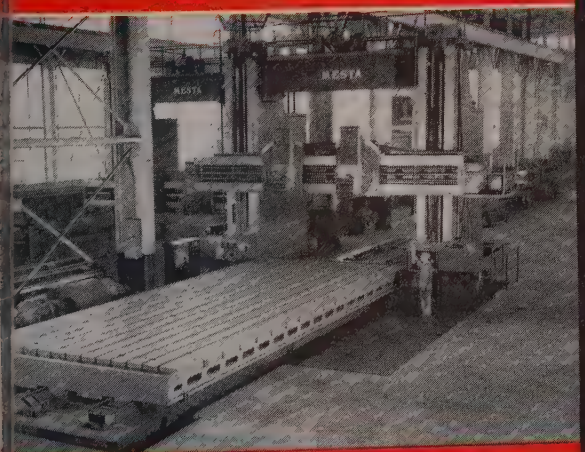
"Today we are facing a similar situation where current demands for steel present problems of indecision



42" FOUR-HIGH, FIVE-STAND TANDEM HIGH SPEED COLD MILL



MESTA 110" FOUR-HIGH REVERSING PLATE MILL



MESTA 14' HEAVY DUTY TRAVELING TABLE TYPE PLANER

Designed and Built By

MESTA

MACHINE COMPANY

PITTSBURGH, PENNA.

on specific requirements for components of new weapons of war. Ordnance developments are by no means static and design of functioning parts of various missiles are not as standardized as their names might suggest. A knowledge of World War II ordnance metallurgy does not necessarily insure proper handling of present day gun, shell or rocket problems.

"It is imperative that both contractors and steel producers have complete knowledge of the significant mechanical properties required, as well as all essential metallurgical quality characteristics peculiar to the proper functioning of each part."

Use of Refractory Specialties Increasing

S. M. SWAIN

Director of research, North American Refractories Co., Cleveland: "High steel production rates have continued to make heavy demands on refractories. There has been a continuation of the close correlation between selection of refractories and the program of furnace maintenance. First object has been to secure dependable furnace operation while reduction in operating costs has been moved to a somewhat secondary consideration.

"Many open-hearth roofs are constructed of two types of silica brick or of silica brick and basic brick. There are several new developments on the use of this combination.

"During 1950 there has been a considerable increase in attention paid to refractory specialties such as mortars, castables, plastic refractories and ramming mixes. On one hand the greater attention has been directed towards securing better service by balancing the mortar or other specialty with the brick being used. In some cases this results in reduced slag attack at joints and in other cases it produces walls that stay mechanically stable for the full furnace campaign.

"In the second case the specialties may involve mortars, castables, or plastic refractories which help reduce furnace repair time either by being in condition to remove more readily or to permit the repair to be done more quickly or advantageously. It is expected that this trend in increased use of specialties will continue."

High Coke Demand Makes Battery Repair Difficult

C. D. KING

Chairman, operating committees, United States Steel Corp. of Delaware, Pittsburgh: "Increased requirements of metallurgical coke both in quantity and quality have posed a number of problems to operators. The uninterrupted and insistent demand for coke has made it difficult to take batteries off for rehabilitation without suffering loss of output. Nevertheless, condition of many batteries has made it imperative to do so, and in a number of cases the situation has been eased by installation of new batteries. Increased mechanization of mines has brought into sharp focus the needs and value of washing facilities, and such beneficiation has become almost standard practice. Application of controlled bulk density by moisture or fuel oil additions has been found to be beneficial where properly applied.

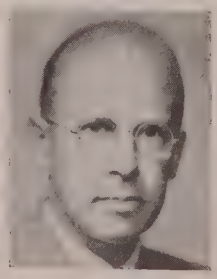
"In the production of pig iron, a number of new and large blast furnaces are presently under construction and will, no doubt, be followed by other similar installations to meet demands for increased metallics for higher ingot output. Continued interest is being manifest in both ore sizing and agglomeration of fines. The industry continues to follow developments with high top pressure, as well as with use of oxygen in the production of ferromanganese and basic iron. Blast furnace operators are vitally interested in improved refractories for hearth bosh and inwalls. Use of taconites, Labrador and Venezuelan ores is moving from the discussion status to actual realization."

Instrumentation for Top Gas Analysis Improving

BRUCE S. OLD

Arthur D. Little Inc., Cambridge, Mass.: "Although substantial advances have been made in blast furnace operation during the past few years along such lines as beneficiated burdens, oxygen in ferroalloy furnaces, and the use of high top pressures on basic pig iron furnaces we are still woefully weak in our fundamental understanding of the blast furnace process.

"Research is required to explain the mechanism of the reactions taking place; to uncover factors affecting ore reducibility; to determine variables affecting coke quality; and to uncover the overall influence of the furnace dimension and operating variables on performance. All of this requires, in addition to laboratory work, more complete instrumentation, data gathering and data analysis on full scale furnaces. A small beginning along the lines of more complete instrumentation with respect to continuous top gas analysis has recently been announced by Republic Steel Corp."



German Process Considered For Taconite Concentration

C. F. RAMSEYER

President, Ramseyer & Miller In... New York: "Impact of the country's current defense program and government pressure for additional capacity has influenced phases of the steel industry. The effect has been especially strongly felt in the raw material field.

"Work on taconite concentration is being intensified by all major producers, but no clear-cut, generally-accepted solution is yet in sight, even though it is estimated that within 15 to 20 years half of our Lake Superior iron units will come from taconite.

"A carefully documented report on a successfully operating Czechoslovakian Krupp-Renn plant has revived interest here in the possible use of this German process for taconite concentration. In contrast to the conventional fine grinding and magnetic separation processes, the Krupp-Renn requires no fine grinding and recovers all forms of iron in the ore, i.e., whether in the form of hematite, magnetite, carbonate or silicate. The coa...

tic iron granules or pellets, running from 92 to r cent Fe, do not have to be agglomerated.

ipment of metallic iron instead of ore would like- increase lake shipping capacity as well as reduce last furnace coke rate. Main disadvantage of the ss is that the product normally contains 0.5 to 0.8 ent sulphur unless reduced with a low sulphur ma- like lignite char.

ost studies indicate that the large scale production of K-R metal from taconite should be not more than er ton. Freight to lower lake ports and conversion g iron would increase this figure by an additional \$8 more.

emand for added steelmaking capacity has also ened interest in the competitive position of the elec- furnace as compared to the open hearth. If pur- d power is available, the cost of an electric furnace is only half that of a modern open-hearth plant e same capacity and it also requires only half the d space."

Sees Short Coke Supply For Years to Come

PHILIP S. SAVAGE

Vice president, Donner-Hanna Coke Corp., Buffalo: "General business improvement evident late in 1949 and early 1950, which was greatly accelerated by the Korean War, had by the middle of 1950 ased the rate of coke oven construction to a point e supplies of coke oven brick may limit the rate nstruction. The expanding needs of the steel industry oke, and the deterioration of many old ovens, make most certain that coke will be in short supply for years to come.

he outstanding feature of 1950 was the extreme de- for certain coke oven chemical products, particular- enzol. Demand for this extremely basic chemical is a 'flash in the pan', and the better price now offered in prospect should be an inducement to all coke ators to improve their recovery of benzol and its logues.

ureau of Mines information circular 7579 shows very lusively the decline in percentage of gross value ributed by gas and coal chemicals to the cost of op- ng a coke oven plant. In 1934 coke carried only 60.3 cent of the load, while in 1948 coke carried 73.1 per of the load. It is imperative that the industry get all values that are economically possible out of the prod- other than coke, and that the high cost of building chemical type coke plants be kept down wherever ible by simplification and standardization of design."

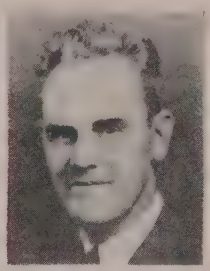
Skilled Direction of Hearth Installation Pays Off

HARVEY N. BARRETT JR.

Assistant manager of sales, Basic Refractories Inc., Cleveland: "During 1950 we established within our sales department a skilled group charged with exclusive responsibility for supervising new th installations in open-hearth and electric arc steel aces, refractory practice surveys, tests, etc.

"The newly created service division designed and acquired equipment for mixing, conveying and compacting Ramset. This special equipment, furnished on a rental basis for new bottom and major bottom repairs, has resulted in superior installations and a major decrease in the time and man hours formerly required.

"This group is a logical outgrowth of the company's decision in 1940 to staff its field sales force with men having practical steel making experience. The availability of men with this background permitted us to provide unique service to the steel industry on its many hearth refractory problems."



High Alumina Refractory Field Merely Scratched

J. L. BRAY

Purdue University, School of Chemical & Metallurgical Engineering, Lafayette, Ind.: "Forty years ago there were about 460 blast furnaces in this country producing approximately 35 million tons of iron per year; today there are only 248 but they are producing nearly 72 million tons. Formerly, destruction of the furnace lining was regarded as inevitable—a necessary part of the cost of production, with the result that the cheapest possible refractories were used in the hearth and stack. Demands for high, and continuous, production and the rising cost of labor now forbid such frequent shutdowns as were commonly accepted in the old days.

"It would appear that in the near future we shall turn more and more to the high alumina refractories (more than 65 per cent alumina). Being cheaper than either carbon shapes or sillimanite it is felt that, as it becomes possible to produce bricks with greater densities, lower porosity, greater volume stability and resistance to corrosion by alkalies, these high alumina refractories with cheaper methods of production will achieve still further economies in furnace operation. These physical properties, in turn, tend to inhibit disintegration by carbon."

New Open-Hearth Charging Idea—Industry Innovation

T. F. OLT

Director, research laboratories, Armco Steel Corp., Middletown, O.: "One of the major obstacles preventing the greater utilization of oxygen to increase ingot production in open-hearth melting has been the operator's inability to charge scrap and other raw materials quickly enough into open hearth furnaces to take advantage of the higher flame temperatures that are possible with oxygen-enriched combustion air at increased fuel rates. While it has been possible to demonstrate material gains in the production rate on individual heats when using oxygen, congestion on the open-hearth floor of scrap charges for various furnaces has prevented attaining the potential production rate indicated on all furnaces in the shop.

"In our new open-hearth shop that commenced operations October 16, this problem has been overcome by the incorporation of novel arrangements for stocking of each

What YOU can do to make the supply of Stainless Steel go further

USS

1

Tell your supplier the exact purpose the Stainless Steel is intended for and how you plan to fabricate it. Then you will get the *right* steel for the job.

2

Minimize your scrap losses by ordering the sizes that will cut to best advantage.

3

Indicate, if possible, acceptable alternates in composition, gage, size and finish . . . it may speed up deliveries to you.

THESE SUGGESTIONS for conserving Stainless Steel are made to assist you during the difficult period we face today. The withdrawal of large tonnages of Stainless Steel—vital for rearmament—make it imperative that supplies of Stainless available for non-military use be made to go as far as possible. This can't be done without the close cooperation of everyone concerned—the steel producer, the steel supplier, and you, the steel user.

AMERICAN STEEL & WIRE COMPANY, CLEVELAND • COLUMBIA STEEL COMPANY, SAN FRANCISCO
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UNITED STATES STEEL

furnace in a manner that does not interfere with the operation of any other furnace in the shop. The procedure employed, which was devised by Mr. E. N. Millan, our chief engineer, provides for stocking each furnace by means of feeder tracks on the pit level of the open-hearth building beneath the charging floor. Individual charging buggies are raised to the open-hearth floor level, using a hoist at one end of the furnace, and after charging, the buggy is returned to the pit level by a similar hoist at the opposite end of the furnace."

Trend to Suspended Basic Port Roofs and Uptakes

RAYMOND E. BIRCH

Director of research, Harbison-Walker Refractories Co., Pittsburgh: "Trend to high fired disintegration-resistant firebrick for blast furnace linings has reached a point where their installation is the rule rather than the exception. In the search for means of maintaining iron production, one operator recently lined a hot blast main with abrasion-resistant refractory castable, completing the job in 36 hours, whereas the usual painstaking job of cutting and fitting brick would have required four days.

"It is significant that planning for open hearths under construction and for those on the drawing boards usually includes suspended basic port roofs and uptakes. During 1950 this practice was extended to 13 additional existing furnaces, and 14 more on order for installation in 1951 will bring the total to 67.

"Inherent advantages of hard burned chrome-magnesite refractories compared with chemically bonded brick in basic suspended port roof construction have been further confirmed during the year and this type is being extended successfully to other areas in the port uptakes.

"Use of basic brick shoulders in the main roof of the open hearth, a practice experimented with since about 1936, has been modified in a manner which reduces the need of hot patching in areas adjacent to the front and rear skews. Sections of each ring are built of metal encased magnesite-chrome keys, which meet the silica brick along a serrated or saw-toothed line.

"Metal mixer refractories continue to receive much attention. Hard fired super-duty linings are compiling enviable records and experimentation is going on with other types including magnesite and high alumina refractories."

Trend to Larger, Powerful Electric Furnaces Continues

HARRY F. WALTHER

Melting superintendent, Steel & Tube Division, Timken Roller Bearing Co., Canton, O.: "Flexibility of the electric arc furnace has been an important factor in directing greater attention to this method of steel production during the past year. When necessary the electrics can produce carbon steels on a fairly competitive basis, especially in favorable areas. Low alloy high strength steels necessary for many uses in industry generally and in our rearmament program which are subject to rigid metallurgical specifications can be more consistently produced in th electrics. Demand for such types is increasing. Compoun and complex metal production is of course a natural fo this method.

"The trend to still larger, higher powered furnaces continuing. This is certain to cut production costs ar put them in a still better position. Plans for new co struction and modernization appear to be rather wid spread. This will greatly increase the 7 million ton a nual capacity within another year."

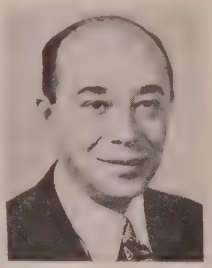
New Type Tool Steels Easy to Harden

GEORGE V. LUERSSEN

Chief metallurgist, Carpenter Steel Co., Reading, Pa.: "O of the most obvious trends in modern manufacture the tendency to produce more and more metal parts blanking and forming from strip or sheet. Produce of tool and die steel have been keenly aware of th tendency, and have endeavored to keep abreast of both by improving the quality of present tool ste and by developing new ones as the demand arises.

"Expansion of this type of parts manufacture h brought with it larger and more intricate dies. High labor costs have made it imperative that machining a grinding operations, and hardening hazards be held a minimum. An answer to many of these problems w to be found in the development of several air hard ing tool steels. These have the combined advanta of eliminating almost entirely the hardening hazard intricate dies; of close adherence to size in hardeni thus minimizing the amount of finish grinding; and longer wearing qualities reducing quantity of tools ma

"While there are several types of such steels re larly in use, two deserve special attention, namely per cent chromium steel and a steel combining th elements promoting deep hardenability, chromium, m ganese and molybdenum. Neither type requires the of a high temperature furnace for hardening; the f mer requires a temperature somewhat higher than t of the usual tool steel, the latter being hardenable normal tool steel temperatures."



New Steelmaking Capacity Now Costs $300 Per Ton

A. E. KADELL

Manager, tin plate dept., Weir Steel Co., Weirton, W. Va.: "I ing the years immediately pre ing the last world war, it was commonly expressed opinion New Deal circles that this count technological development had attained full maturity no further expansion particularly in heavy industries justified. This philosophy, combined with the comparat ly low level of business activity in those years, discoura any noteworthy expansion in steelmaking capacity. Du that period, however, a considerable increase in the p ulation of the country took place. World War II pyram demand and increased purchasing power so much t expansion over the last few years is insufficient.

"Meanwhile, rapidly rising prices have produced very difficult situation where it now requires an alm prohibitive investment of close to $300 per ton of steelmaking capacity. The effect of this condition has t to stimulate intensive efforts to find ways and mean

ng increased steel production from existing fa- s Use of oxygen, enlargement of present open- urnaces to the extent that in two shops heats of to 550 tons are now being tapped, and the tying e bessemer converter with open-hearth operations e examples of what is being done to increase rom existing facilities. Fortunately, these devel- have also brought with them some operating es."

Armed Forces Directing Titanium Alloy Research

F. R. HENSEL

Vice president, P. R. Mallory & Co. Inc., Indianapolis, Ind.: "The predicted high strength alloys of titanium are becoming a production reality. Intensive evaluation of properties on large production under way. The armed forces, who will be the initial consumer, are co-ordinating and direct- earch and production efforts. The year 1951 prom- be the turning-point year in titanium alloy pro- history.

oft magnetic material is finding wide acceptance elevision deflection yoke core. It can be pressed e size and shape tolerances, and presents an ad- e over conventional laminated iron—no assembly ssary. Permeability of the material is higher than conventional pressed iron cores. Promise of its ess for audio frequencies has been demonstrated.

oteworthy advancement in the field of nonferrous rgy is the development of a new zirconium-cad- opper base alloy which derives its excellent me- al and physical properties from a rigidly con- heat treating and working schedule. The new finding wide use as a resistance welding electrode al, particularly for mash seam welding and seam of coated steels."

Mechanized Powder-Scarfing Slashes Conditioning Costs

E. M. HOLUB

Development engineer, Linde Air Products Co., New York: "Powder-scarfing is rapidly reaching a prominent place as a means of conditioning stainless steel. For some time now it has been an ac- tool but limited to conditioning of ingots, blooms, llets. During 1950, development of new equipment echniques extended this process to the primary oning of thin slabs for stainless sheet and coil al. For the conditioning of stainless steel slabs, owder-scarfing process has proved equal to and, ny cases, superior to mechanical methods of con- ng from the standpoint of final product quality etal loss.

chanized powder-scarfing has reduced the initial ioning costs on slabs by as much as 50 per cent compared to grinding. In addition it has reduced l conditioning time on slabs to one-sixth that nor- required for grinding. Perhaps an even more valu- actor noted by present users is that secondary conditioning on sheet and coil product is greatly reduced after powder-scarfing. With these important reductions in time and costs an increasingly wide usage of powder-scarfing is developing. These activities are certain to bring continued technological advances in this field."

New Die Steel Helps Increase Production Runs

R. B. HEPPENSTALL

President, Heppenstall Co., Pittsburgh: "The most significant development in our particular branch of the heavy forging industry—namely that of supplying die steels for the drop forging industry—has been the successful introduction, following several years of research, of a new alloy steel for press dies and upsetter dies and punches. The new steel is a low carbon-nickel-molybdenum type having precipitation hardening qualities.

"The steel has three characteristics which are most desirable in service: Improved retention of hardness at elevated temperatures; improved resistance to thermal checking; and an ability to withstand water cooling without cracking, regardless of high temperatures developed in service.

"Dies made from this analysis are producing runs substantially in excess of those which have been obtainable in the past from regular die and hot work steels, including the 5 per cent chromium and semi-high-speed types. The material is commercially available under the trade names of Prestem and Presneal; the former being sold in the prehardened condition while the latter is furnished annealed to be hardened by a simple air treatment following machining."

Scientific Research—Hope Of Today's Steelmakers

KARL L. FETTERS

Assistant to vice president in charge of operations, Youngstown Sheet and Tube Co., Youngstown: "Beneficiation of ore and coal, and increased efficiencies with better control of iron and steelmaking processes are today's aims. Iron and steelmaking processes are high temperature, chemical processes. Physical, chemical and thermodynamic studies of these processes tell us what we can do and how. No one invented the application of physical chemistry to steelmaking. Charles H. Herty Jr. and John Chipman have shown its practical benefits and pointed the way toward the future.

"Currently slag-metal, slag-gas, and metal-gas research is going on in many university and company laboratories. The American Iron and Steel Institute is sponsoring valuable work in this field. A brief resume of a few of the sponsored projects is presented in the following:

"Equilibrium in the distribution of sulphur between slag and metal has been studied for slags of blast furnace type covering a wide range of compositions. Effect of other elements, especially manganese, on the equilibrium and rate of removal of sulphur has been studied. Current work includes the effect of silicon and a study of the distribution of silicon between slag and metal.

"Distribution of chromium between liquid steel and slags of the open-hearth type is being studied. This research is aimed at a better understanding of the recovery or elimination of chromium in basic open-hearth operation.

for years ... the cho

NEWS ITEM

Large Order Placed For Annealing Furnaces

A contract for what is probably the largest single such commitment for coil annealing furnaces was recently placed by a large steel company.

Twenty furnaces and six bases are to be built by Surface Combustion Corporation, Toledo, Ohio, under the terms of this contract. The furnaces will be of the horizontal radiant tube type and will be arranged with the sixty bases in a double row, each base accommodating eight stands of coils.

The annealing cover will accommodate coils 67 inches outside diameter which may be piled to a maximum height of 148 inches. Total weight of coiled steel per base will be approximately 450 tons. The furnaces that as much as 27,000 tons of steel may be in process at any one time.

It is believed that this is the largest single contract for such equipment ever placed by any company.

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Controlled Atmosphere Annealing Covers for Coil and Sheets

Continuous Furnaces for Heat Treatment of Steel Plate

Controlled Atmosphere Furnaces for Carbon Correction in High Alloy Rod and Bar Stock

Continuous Type Bright Annealing and Normalizing Furnaces

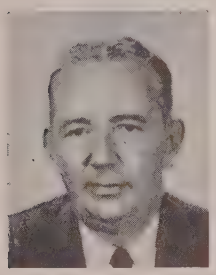
Prepared Gas Atmosphere Generating Equipment

Pit Type Convection Furnaces for Rod Annealing

Stress Relief Furnaces

Wire Patenting Furnaces

Desulphurizing power of basic electric furnace steel slags, including the conditions for formation and decomposition of calcium carbide and its effect in deoxidizing or desulphurizing the metal, is being examined. The distribution of oxygen and sulphur between liquid iron and slags of low iron oxide content was also measured. It is planned to conduct a study of slag constitution based on electrical conductivity measurements. Most of the previous work has been done on silicate slags."

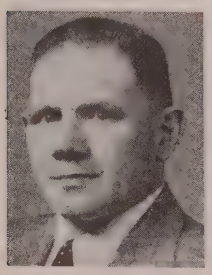


Cupola Oxygen Practice Seen as Production Tool

R. O. DAY

Development engineer, Linde Air Products Co., New York: "Important among recent advances in gray iron cupola practice is the advantageous use of oxygen blast enrichment. Judicious use of oxygen has been found to increase both temperature and melting rate without added damage to cupola linings. General pattern set for oxygen use in the cupola is as a production tool to be used intermittently to overcome unsatisfactory operating conditions when they occur. Such use involves injection of oxygen into the blast for a period of two to five minutes to counteract such conditions as low iron temperature, low melting rate, or a tendency of the burden to hang or bridge.

"Rate at which oxygen is injected into the blast depends, of course, on the blast volume, but is generally such as to enrich the blast by 4 to 5 per cent. While, as stated above, length of time for oxygen injection may vary from two to five minutes, a three-minute injection is ample in most cases and as short a time as one and a half to two minutes has been known to give the desired results."



Sees Shorter Bearing Length In Finished Wire Dies

EDWARD J. P. FISHER

Metallurgical engineering consultant, North Jackson, O.: "Vertical storage of hot-rolled wire rod coils, permitting greater storage capacity per square foot of floor space and more effective segregation of grade lots than afforded by conventional horizontal storage systems is one of today's significant technological advances. Initial installation includes an overhead crane system with an ingenious hairpin hook having an expanding toothed arbor for vertical lifting and horizontal transport of rod coils.

"Another innovation is the increased adoption of a hot borax solution as a complete or partial replacement of the time-honored lime bath for neutralization and coating of pickled rods. Results include thinner and more uniform coatings on the drawn wires and longer die life. The more expensive phosphate coatings, although more rust resistant than borax coatings, have not been as widely substituted for lime.

"A very recent and radical departure in the use of 'dry' drawing lubricant has been developed by a supplier and adopted by a wire and bolt producer. This innovation eliminates the use of dry powdered lubricants at the wire drawing machine. Instead, the proper lubricant i applied to the rod coils at the end of the cleaning roon cycle, by dipping coils in a hot aqueous solution of th lubricant, then draining. Results of this treatment are Prevention of lubricant wastage at the die box; close control of lubricant composition and texture on the fin ished wire; more uniform residual lubrication on the wir for protection of dies and tools used in subsequent col heading, extruding and other bolt-making operations."

Iron Ore Picture Better in 5 Years

L. F. REINARTZ

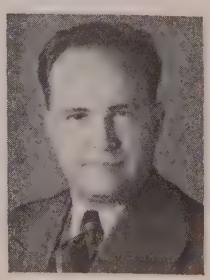
Assistant vice president, Arm Steel Corp., Middletown, O.: "T coal mines of the steel-owned ca tive group, every effort is bei made by careful mining and co washing to keep the ash low coals for coking purposes. Such practice has broug with it added moisture in the fine coal which is inco venient in the summer and a serious problem in the wi ter. Dewatering equipment, or the use of oil on the co is helping improve this condition.

"In blast furnace operations, steel men can't ma up their minds whether high top pressure is helpful not. Use of carbon hearths is still in the experimen stage. Some plants have had good success with th installations and others have had rather indifferent r sults.

"Silica in most iron ores has increased in recent yea and the iron content has gone down. These factors ha caused a decrease in blast furnace production in ma plants at a time when maximum pig iron capacity required.

"Steel companies are exerting every effort to prot their future with the acquisition of adequate ore su plies. Labrador, Steep Rock, Venezuela are names wh are continually in the limelight. Taconite ores will beneficiated in the next five years. There is every e dence that at the end of that period the iron ore pict from a quality and quantity standpoint will look bet

"Many blast furnace men look with longing eyes an opportunity to size materials going into their f naces. Due to plant and ore yard layouts, few operat can actually practice this method of charging their f naces."



Continuous Magnesium Mill To Roll Sheet Product

CHARLES E. NELSON

Technical director, Magnesium vision, Dow Chemical Co., Midl Mich.: "Production of nodular i by magnesium treatment is exp ed to increase five-fold yea Current investigations promise desulphurization of pig iron down to about 0.02 per cen with magnesium additions of about 0.2 per cent.

"Announcement of a method of co-extruding magn ium powder with other hardening elements in amou beyond the alloyability range by normal techniques, op a wide vista of important new 'interference harde magnesium alloys of high properties and having other markable qualities such as high resistance to stress

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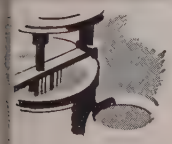

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and Metal Soaps

Agricultural
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and Colors

Chemical
Commodities

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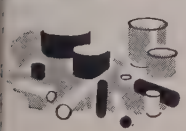

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rosion. The process is in the pilot plant stage.

"Cast magnesium—3 per cent rare earth—zirconium alloys (EK30) have successfully passed development stages and are in fairly large procurement. They provide higher strength at operating temperatures of jet engines than older alloys. Research has shown that the most effective rare earths are the combination known as 'didymium', comprising neodymium and praeseodymium.

"Big news in the magnesium industry is the modern continuous sheet rolling mill now under construction. This has been made feasible through improvements in metallurgy and processing which have already brought magnesium extrusions and die castings into a commercial competitive position."

"Zebra" Roof Construction Gaining Popularity

R. P. HEUER

Vice president, General Refractories Co., Philadelphia, Pa.: "Most notable innovation in open-hearth construction since the advent of all-basic ends is the so-called 'Zebra' roof. Since mid-July 1950, this construction has been gaining popularity faster than any other construction in open-hearth history.

"Zebra construction—which is used only in zones of greatest wear in the roof—usually comprises alternate rings of regular or super-duty silica wedge brick, with rings of similar width comprising either two keys or a wedge brick of unburned chrome-magnesite having integral steel plates.

"During 1950 a large number of plants have initiated trials of these roofs at a rate which promises to shortly put this construction in a great many American open hearths. This unparalleled development stems from the fact that in virtually all plants, these roofs either increase roof life 25 to 50 per cent or drastically reduce patching. Several plants have adopted this type roof practice for all furnaces."

Immersion Pyrometry Gains In Open-Hearth Acceptance

D. T. ROGERS

Assistant director of technology, Jones & Laughlin Steel Corp., Pittsburgh: "One of the most significant developments during the year, in our opinion, was the degree of acceptance gained by immersion pyrometry for bath temperature control in open-hearth shops.

"Time was when judgment of open-hearth bath temperature scorned the use of instrumentation. Within the past several months, however, bath pyrometry has progressed to the point where it is no longer a question of whether pyrometers should be installed, but rather which type is best suited to the purpose.

"There is a considerable degree of acceptance for both the blow-tube radiation-type and the immersion thermocouple. Each has provided satisfactory results and has its proponents. It is not our purpose here to attempt evaluation of the relative merits of the two instruments.

"A number of shops have brought their development work to a point where definite tapping temperat ranges have been established and are in everyday for the various grades of steel produced. Among obvious benefits to be derived from improved tempe ture control made possible with bath pyrometry Reduction in frequency and severity of ladle skulls mold stickers."

Statistical Quality Control Aids Rising Production

ARTHUR E. FOCKE

Chief metallurgist, Diamond C Co. Inc., Indianapolis: "A the 1950 National Metals S theme represents the current cipal problem in industrial search. This problem is how maintain high production of high quality parts or ass blies in the face of critical material shortages.

"On this problem, our experience in World War II be extremely useful. It can point out reasonable tions and also it can prevent the repetition of som our mistakes. Or, at least it can make more ob the price we must pay for some substitution.

"The general principles of quality control through tistical analysis are more widely understood now used properly, they can be an important aid in critical period.

"The latter result is extremely important for with shortages of critical metals we are beginning to feel effects of shortages of trained men. Therefore, most important that every industrial research proje scrutinized to be sure that the objective is stated c ly and that the method has been considered caref

Stainless Steel Powder Metallurgy Advances

GEORGE A. ROBERTS

Chief metallurgist, Vanadium-Alloys Steel Co., Lat Pa.: "During the past year, we have pursued the dev ment and application of steel powders to industrial Significant strides have been made in the powder m lurgy of stainless steels and during the year a new less steel powder was announced which could be ha by standard powder metallurgy techniques and v after coining and resintering, would yield parts wit sile strengths of up to 90,000 psi and elongations to 40 per cent. For moderate strengths, equivale those obtained by normal powders, this stainless powder is sintered at a temperature as low as 210

"Continued interest in the application of medium steels to high strength and wear resistant prod parts made by powder metallurgy has been notic addition, the employment of spherical powders of less and heat resistant compositions for filters and porous parts which must transmit gases or liquid gained wide-spread attention.

"In the tool steel field the high-carbon and hig adium high speed steels which were introduced s years ago have continued to gain in popularity and cation. It has been shown that these steels conta preciable quantities of vanadium carbide which is h than aluminum oxide. These steels have proved cable to such noncutting applications as dies, high perature bearings, etc., where resistance to wear is c siderable importance."

Casting

RONING or "C" process for producing thin sin-sand shell molds on heated metal pat-rns is the big excitement in the foundry dustry. Dozens of apparent advantages wait proof in production.

RAY IRON melted in the basic-lined cupola, ecause of low sulphur content, is ideally uited to treatment converting it to nodular r ductile-type iron.

ODULAR iron is not regarded as a likely ubstitute for malleable of the ordinary type any considerable amount, so long as cost a top item.

ECHNIQUES of gating molds, to permit etal to enter without harmful turbulence, re undergoing substantial modification and nprovement.

IATHERMIC methods of core drying have een extended to larger cores than it was nce thought possible to handle.

ENTRIFUGAL casting now furnishes carbon nd alloy steels with greater density and mproved structural properties, particularly or high-temperature service.

LUMINUM die castings have proved the nswer to demands for close tolerances in ntricate valve bodies and pumps for auto-natic transmissions, minimizing machining nd grinding.

EVELOPMENT of a suitable die steel to vithstand thermo stresses incident to the die asting of brasses is still a major problem.

Semicontinuous Casting in Commercial Use During 1951

JAY J. SEAVER

Jay J. Seaver Engineers, Chicago: "Great demand for more steel production gives impetus to new developments. Although the present price of steel is high, new methods are being developed which will reduce the cost of producing steel, by reducing both the space required and equipment for making it.

"Semicontinuous casting of steel offers improvement in this direction. Continuous casting of steel has been, and is still being, experimented with by different methods.

"Experiments are now being carried on in Chicago with a centrifugal semicontinuous method, known as the the Seaver-Wuetig system, which has solved many difficulties experienced with the continuous method.

"In this operation, steel is poured into a long horizontal ladle, which in turn is discharged into a horizontal revolving drum. In this drum is a large continuous spiral thread, into which the hot metal is thrown by centrifugal force. As the drum rotates, the hot steel in the thread unwinds and produces a bar with a cross section equal to the depth and width of the thread, and of a length equal to its circumferential length. The hot discharged bar can then be rolled into strip, bars, rounds or other products required.

"This method of semicontinuous casting and rolling eliminates considerable expensive equipment, such as molds, strippers, soaking pits, blooming mills and auxiliaries, also space to accommodate the same.

"The semicontinuous casting system will probably come into commercial use in 1951 and can be applied to many isolated nonintegrated steel plants, where there is a supply of scrap and melting facilities."

Nodular Iron Important As Defense Substitute

E. B. SHERWIN

President, Chicago Hardware Foundry Co., North Chicago, Ill.: "A considerable amount of time and energy has been expended and experimentation has been going on to develop nodular iron to a state of perfection whereby repeatedly uniform castings can be produced successfully. Interest in this cause has been evidenced by the fact that a Nodular Iron Symposium sponsored by the Massachusetts Institute of Technology was held recently which brought together American workers in this field and those in England and on the Continent. This symposium was arranged principally to stress the advance of nodular iron development as based on ASTM activities to set up definite specifications.

"As a sidelight, I might mention very briefly the potential importance of this material due to the fact that it can be used as a substitute for higher strength metals in defense activities and, therefore, any methods which will facilitate its production, such as basic cupola melting, will be of great interest to foundries as it will necessarily prepare their industry for a leading role in the rearmament program.

"The Gray Iron Founders' Society is taking a very strong position as concerns aiding the Government through participation on the Foundry Industry Advisory Commit-

tee and its own Gray Iron Subcommittee and Technical Subcommittee.

"In addition, there has been considerable development in the production of castings by the Croning or 'C' process. It appears that use of this process, besides insuring a high degree of dimensional precision in the final castings, will free foundrymen from the necessity of handling and conditioning large masses of molding sand. In connection with this process, there has been developed a method of cleaning castings which stress relieves at the same time."

Today's Pig Iron Shortage Plagues Ironmakers

WILFRED H. WHITE

Metallurgist, Jackson Iron & Steel Co., Jackson, O.: "Probably the most significant factor in the iron industry at present and for the immediate future is the shortage of pig iron. Silvery pig iron is an exception in that the demand mushrooms rapidly and the shortage is greater than for normal pig iron grades.

"Three following factors are involved, which should be recognized by the industry: Normal fluctuations of the business cycle at times create an increased demand for silvery. This is expected and the producers have a fighting chance of satisfying this demand. When regular grades of pig iron are short, the melters substitute scrap and silvery pig to make up the tonnage difference. When there is a large demand for pig iron, blast furnaces drive for maximum tonnage. This has the effect of producing a lower silicon content. Silicon is produced by a slow, soaking process. Therefore, the faster the furnace is driven the lower the silicon content and vice versa. This, however, leaves the foundryman short of silicon in his heat and he demands silvery to make up the difference.

"The last two shortages, however, are not the fault of the silvery producers.

"During periods of high demand, it is often asked why another silvery furnace is not built. On the other hand, during periods of low demand many foundries use 40 to 60 per cent pig iron in their heat or else secure up to 4 per cent silicon in their regular grades of pig iron. Then they do not require any silvery pig.

"Use of the same per cent of pig iron, silvery iron and scrap in the heat at all times would help to stabilize the demand and exaggerated shortages would not occur."

Teamwork Pays Off in Steel Casting Progress

WILLIAM H. WORRILOW

President, Lebanon Steel Foundry, Lebanon, Pa.: "Research and its practical application to foundry requirements is being reflected in many evidences of progress in the steel casting industry. It is the key to important advances in mechanical procedures, perfection of new processes and refinement of the old.

"Particularly significant is growing recognition of the importance of correct design, and widespread adoption of the concept of technical collaboration by steel foundry and design engineers. Underlying principle of this engineering teamwork approach is that seldom can any structure be considered to be so perfectly designed that improvement is impossible. Fuller understanding between designers and foundry engineers thus becomes a practical matter of adjusting objectives of one to facilities of the other. Joint study of specific designs in this type of teamwork performance now frequently leads to substantial improvement and becomes a consequential factor in achievement of lower costs, improved castability and other advantages embodying required characteristics of quality, utility, and essential strength.

"Demand for engineering castings to serve at elevated temperatures has brought many improvements in methods of centrifugal casting steel and alloys. Higher quality castings with greater density and excellent structural properties are being produced in quantity by advanced methods. In this field, increasing quantities of tubular and cylindrical components for production of jet engines are being made, and the process offers significant possibilities for production of circular shapes.

"Modern requirements of high pressure service, along with high temperature, corrosion-resistant and shock-resisting qualities, similarly have created metallurgical demand for development of materials to meet the service requirements of engineering components of steam power plant, gas turbine, oil refinery and other industries."

Basic-Melted Gray Iron Ideal for Ductile Types

C. O. BURGESS

Technical director, Gray Iron Founders' Society Inc., Cleveland: "The gray iron industry during the past year has undertaken an extensive technical development program to increase the usefulness of its product to industry and to acquaint engineers and designers with resulting engineering and economic advantages.

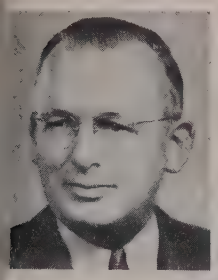
"As a first step in this direction, a complete survey has been made of metallic and nonmetallic coatings that can be applied to gray iron that will permit it to meet exposure to extreme wear, heat and various chemical atmospheres. A number of developments, such as aluminizing the surface of gray iron by hot dipping, have now passed from laboratory to commercial stage. Definite advances have likewise been made in methods of high temperature welding, joining and cutting gray iron. Particular advance is evident in the brazing and silver solder fields with the surface of the gray iron prepared for such treatment by a simple degraphitization process.

"As for production of gray iron itself, two processes have been the subject of intensive study and development. The first of these deals with basic cupola melting replacing traditional acid melting. In this process the interior of the cupola is lined with magnesite brick or a monolithic magnesite. Iron melted in this basic type of cupola exhibits a marked increase in total carbon and in temperature, together with a substantial decrease in sulphur content. Dephosphorization can be effected under special conditions. Basic melting will apparently go far towards freeing foundries of their absolute dependence on adequate pig iron supplies and to some degree decrease the necessity for low sulphur coke.

"One of the most important off-shoots is that basic-melted gray iron, because of its low sulphur content, is particularly suited to the production of new nodular or ductile type irons. The process will promote early realization of promise shown by these forms of gray iron.

"The second most significant development, the 'C' or Croning molding process, facilitates precision casting us-

ng thin, resin-sand shell molds formed on heated patterns. This process, developed by Croning in Germany, permits very rapid casting production, excellent dimensional accuracy, together with very smooth casting surfaces. Since pattern costs are relatively high and there appears to be some limit to casting sections that can be produced, it must be considered as being still in the development stage, although it has already been applied on a semicommercial scale by a number of foundries."



Sand-Resin Casting Process Economical and Accurate

C. L. McCUEN

General manager, Research Laboratories Division, General Motors Corp., Detroit: "Development work on the sand-resin casting process has been continued during 1950. This technique looks promising as a comparatively low cost method of producing castings having excellent surface appearance and a high degree of dimensional accuracy. In time, it seems that many production parts will be made by this process.

"Carbo-nitriding has further replaced liquid cyaniding in the heat treatment of parts requiring a shallow wear-resistant surface layer. Similarly, induction hardening is being used as a replacement for carburizing in obtaining a high strength wear-resistant surface layer.

"During the past year great interest has developed in the basic-lined cupola in connection with lower cost production of ductile cast iron. Encouraging results in producing low sulphur content base irons are reported for several cupolas thus lined. If the expected low production costs are realized, the potential field of use of ductile cast iron will be greatly expanded.

"The present shortage of critical alloys will probably require that lower alloy steels be substituted for those currently used in certain automobile parts. With the aid of hardenability control, results comparable to those obtained with the higher alloy steels may be expected."

"Welded Assemblies" Now Produced on Large Scale

JOHN HOWE HALL

Swarthmore, Pa.: "Three different research organizations have conducted studies on the flow of metals into molds, and have reported their findings. As a result of their investigations, the technique of 'gating' molds, to permit the metal to enter them without harmful turbulence, splashing, etc., is undergoing substantial modification and improvement. In particular, many time-honored methods were found not to give the results they were supposed to, and are being modified.

"Action of the so-called 'pipe-eliminators' used to make the sink-heads on steel castings feed their contents into the solidifying castings in a more efficient manner, has been the subject of a careful research. In addition, great progress has been made in adapting the newer type of riser compound, classed under the generic term of 'modified thermit' materials, to the manufacture of large steel castings. With these newer materials, it has been possible to make reductions in the size of the sink-heads, without sacrificing soundness in the castings.

"Further studies on reclaiming steel foundry sands for re-use have been made during the year. In at least one large plant, it has been possible to reduce the consumption of entirely new sand greatly.

"Further progress has been made in the use of the Washburn or necked-down type of sink head, first developed many years ago when cutting torches were unknown in steel foundries, and recently revived at the instance of the Steel Founders' Society of America. Considerable savings in the cost of cutting off and trimming sink heads have been attained in this manner.

"Use of diathermic methods of core drying has been extended to larger cores than it was at first thought could be handled by this method."

Aluminum Die Castings Increasing in Favor

J. C. FOX

Chief metallurgist, Doehler-Jarvis Corp., New York: "The die casting industry continues to expand and flourish. Last year saw a great increase in both production and consumption of die castings, particularly those of zinc and aluminum base alloys.

"One outstanding development of 1950 was the increased use of aluminum die castings for automotive construction. Where previously aluminum die castings were only sparingly used in relation to zinc die castings in automobiles, the trend towards general adoption of automatic transmissions, for one, has forced the greater use of aluminum die castings for intricate valve and pump parts, for which die castings appear indispensable.

"There are a number of other novel uses of aluminum die castings which have displaced other materials in automotive construction—one of which is a large one-piece aluminum die cast door garnish molding which replaced a steel stamping in one make of car. Aluminum is destined to play an ever increasing and more important role in future automotive design and in which aluminum die castings are bound to be significant.

"Trend towards the increasing size of die castings which necessitates the building of larger die casting equipment and facilities to handle them is also to be noted. With suitable equipment and experience available there does not appear to be any size limitation. Along with the increased size of casting equipment, large-sized automatic polishing, plating and other finishing equipment become mandatory and in this direction huge strides have been made during 1950."

Rising Raw Material Costs Test Management's Ability

N. B. ORNITZ

Vice president, and manager of foundry operations in the Pittsburgh district, Blaw-Knox Co., Pittsburgh: "Steady pressures of increasing raw material costs and higher wages pose a test of courage, as well as the technical competence, of management.

"In a courageous business philosophy there should be no compromise with the primary obligation to create more productivity and cut costs in order to offset the rising price cycle. Evasion or half-hearted efforts at cost-cutting are self-defeating, because they prejudice employee understanding. There is no point in denying the

SOMETHING SNAPPED

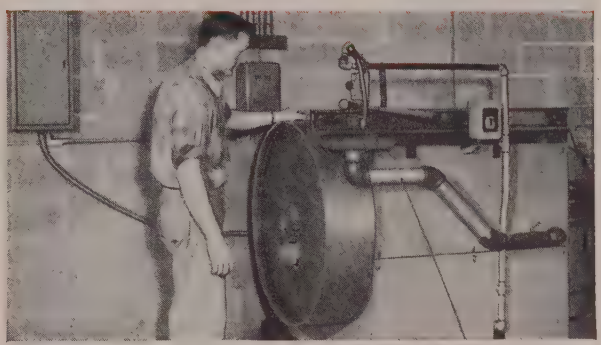
once too often .... then

OPERATOR CONVENIENCE is enhanced by placing speed control of G-E Speed Variator near this vertical bull block.

GENERAL ELECTRIC

Bishop Co. tried adjustable-speed drive and set new production records!

"PACKAGED" SPEED VARIATOR has a 4 to 1 speed range for drawing platinum wire on a vertical bull block.



G-E TYPE ACA MOTOR with a 3 to 1 speed range drives horizontal bull block, brings machine up to speed without "snapping" stainless-steel tubing.

WHEN you're drawing wire and tubing thinner than a human hair, frequent breakage can be a major headache. At least it was for the J. Bishop Company until electrical adjustable-speed drive came to the rescue.

If a drawing or spooling machine drive came up to speed too fast, "SNAP"—another die had to be changed. Or, if the equipment was operated slowly, production was severely limited.

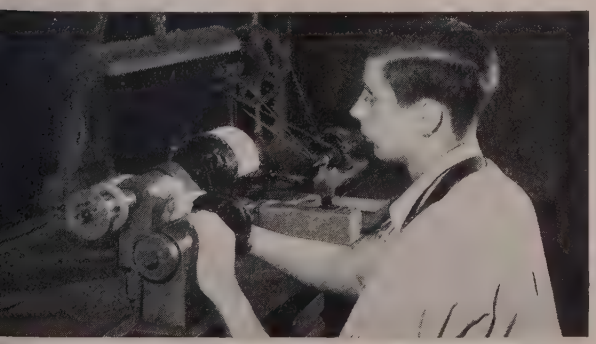
Finally, "something snapped" once too often—and General Electric adjustable-speed drives were selected for the different types of machines. A G-E Speed Variator with a 4 to 1 speed range was installed on a vertical bull block. Result? One simple drawing operation instead of the complicated swaging and multiple-die drawing formerly required. Next, a G-E Type ACA motor with a 3 to 1 speed range was put on a horizontal bull block, drawing stainless steel tubing. Production jumped from 28 fpm to 120 fpm. Finally a platinum spooling machine was equipped with a G-E Thy-mo-trol* drive. Jerking and breaking are rare now and the spooler can handle any diameter from .001 to .020 inch, thanks to the 20 to 1 speed range of the Thy-mo-trol drive.

Chances are you, too, stand to gain from an efficient application of *electrical adjustable-speed drive* somewhere in your plant. To help you profit from these opportunities, we suggest you do the following:

1. Send for our 24-page bulletin (GEA-5334), "Getting The Most Out Of Your Machines."
2. Call in a G-E engineer to help you with application details.
3. Keep in mind that General Electric can offer you *all* types of electric adjustable-speed drives in speed ranges of 3 to 1 to 50 to 1.

Apparatus Department, General Electric Company, Schenectady 5, New York.

*General Electric Co. registered trademark for electronic drive.



G-E THY-MO-TROL DRIVE operates platinum-wire spooling machine over 20 to 1 speed range, replaced drive which lost power at slow speeds.

GENERAL ELECTRIC
Headquarters for
Electrical
ADJUSTABLE-SPEED DRIVES

evidence represented by the daily conveniences we all enjoy, that all employees benefit directly from this effort. In fact, a rising standard of living is not possible without it.

"Hence, the need should be faced frankly. Supervisors should be encouraged not only to push a campaign of greater productivity openly, but also to explain it so that all employees will identify themselves with and co-operate in the effort."

Zinc Die Castings To Aid Defense Effort

R. DAVISON

Manager, Market Development Division, New Jersey Zinc Co., New York: "Durable goods of many types continue to incorporate functional and decorative die castings in their assemblies. Inasmuch as economists predict the rate of consumer demand for such goods from automobiles to household appliances to exceed all but one or two postwar years, volume of zinc die castings in the domestic economy should remain as high as defense program demands allow.

"There is no reason to doubt that zinc die castings will be called upon in the rearmament program. This modern high-speed production method was employed for many ordnance parts, as well as in other functional applications, by the armed services in World War II. Their performance record again suggests adoption for the 1951 defense program."

Malleable Foundries Save Strategic Manganese

JAMES H. LANSING

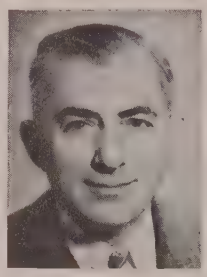
Technical and research director, Malleable Founders Society, Cleveland: "During 1950, the malleable iron industry took further steps to assure maintenance of the quality of its products. Metallurgically, these included better equipped laboratories for close and continuous control of the product as well as the employment of more engineering school metallurgical graduates.

"Many plants engaged in duplex-melting (cupola-air furnace or cupola-electric furnace) have better controlled sulphur content by the installation of desulphurizing hearths between the cupola and air furnace. In these hearths a continuous and regulated flow of soda ash assures lower and more uniform sulphur content. This in turn reduces the required amount of manganese, a strategic element in time of war.

"Direct air furnace melters made improvements in furnace charging equipment and again took steps effectively to adjust their melting to the use of a somewhat reduced amount of pig iron but with no reduction in the quality of the product.

"In both types of foundries, improvements were made in molten metal handling equipment. Time, temperature and heavy work were all saved by the use of insulated conveyor ladles as well as direct pouring from suspended ladles, to the extent practicable.

"New annealing equipment installed is generally either of the gas fired radiant tube or electrically heated type requiring no protective containers for the castings. These installations somewhat reduce annealing time requirements, although the operation is still very effectively conducted in many periodic or continuous ovens in which the castings are packed in protective iron boxes or 'pots' pulverized coal or oil supplying the required heat."



Brass Die Casting Industry Lacks Suitable Die Steel

CHARLES PACK

Vice president, Doehler - Jarvis Corp., New York: "Production of die castings continues to increase annually and it is safe to say that production during 1950 will be at least 25 per cent higher than any previous year. There can be no doubt that production will continue to increase and become progressively a more important factor in the metalworking art.

"Progress in die casting must follow in these two directions: Production of increasing unit size and volume and development of suitable steel for brass die casting.

"We see more and more larger die castings produced and a good illustration is the current radiator grille of the 1950 Packard car. Its frame is more than five feet in length and two feet in width and has a large plated surface. Progress is being made continually on the size of die castings that can be produced; at the present time we can say there is no limit to the size of a die casting.

"While some progress has been made, it must still be recognized that development of a suitable steel to withstand thermal stresses incident to brass die casting is still a major problem. A small tonnage is being produced, but development of a suitable steel for this purpose would open a tremendous field for die casting."

Oxygen Enriched Cupola Blast Could Up Output

H. A. SCHWARTZ

Manager of research, National Malleable and Steel Castings Co., Cleveland: "If the expected pressure for production continues to increases, the effect on the malleable industry will, of course, be toward increasing the output of existing plants by minimum additions to equipment and insignificant additions to buildings. This would seem to put pressure on the quick annealing types of malleable which are suited only to castings of limited thickness. This pressure will be felt most strongly in those plants where annealing capacity constitutes the bottleneck.

"Possibly experimentation with oxygen enriched cupola blast, and/or an increased use of preheaters for supply blast, might increase the output from a given duplex melting unit. For heavier types of malleable castings, adoption of the high silicon variety of malleable iron will be limited by the tendency to mottle.

"So far there seems to be no reason to anticipate that nodular cast iron will substitute for malleable castings of the ordinary type in any considerable amount. This condition will continue so long as cost is an item."

Forging and Forming

- COLD extrusion is one of the hottest subjects in the press field. Army Ordnance is extruding artillery shells on a hydraulic press; more uses are imminent.
- AIR-LIFT drop hammers, providing selective long or short stroke control, are finding more acceptance.
- CLOSED impression dies are a valuable aid in saving strategic alloys and in improving physical characteristics of forgings.
- ROLL forging machines are tackling heftier jobs, and are economically rough forming blanks for finish forging.
- HYDRAULIC presses of 35,000 and 50,000-ton capacity are in the works for producing large aircraft components in a single stroke; a 75,000-ton unit is being considered.
- METHOD of rolling integrally stiffened aluminum alloy sheet has been developed on a limited production basis under an Air Forces experimental contract.
- NAIL machines, built on cold-header principles and operating continuously, carry reels with enough wire for an entire day's run at speeds 50-100 per cent beyond former standard practice.

Extrusion Process Cuts Airplane Skin Weight 10%

D. P. REYNOLDS

Vice president, domestic and foreign marketing, Reynolds Metals Co., Louisville, Ky.: "A revolutionary new process squeezes out aluminum airplane skin complete with built-in stiffeners for wings and fuselages. It eliminates much work and many of the attachments formerly required, reducing number of parts in a typical structure by 60 per cent; overall weight is cut about 10 per cent.

"To meet wartime demands for this type material by machining a thick plate to leave only thin skin with reinforcing fins would require more milling machines than would be available and involve an enormous waste of cutaway aluminum. So the development is most significant from the standpoint of an overall wartime economy.

"In the new method, a large tube is extruded with the reinforcing fins integral on the outer surface. The tube is then slit and flattened, producing the integrally reinforced skin. Experimental work so far has produced skin nearly 28 inches wide, weighing 5.78 pounds per square foot with 14 T-shaped integral stiffeners running lengthwise and equally spaced across the width. Skin thickness is 0.07-inch. It has been produced in the high-strength alloy, 75S. This extrusion process was developed by us under an experimental contract with the Air Materiel Command, United States Air Force.

"A method of rolling integrally stiffened aluminum alloy sheet was developed on a limited production basis under another Air Force experimental contract. The integrally stiffened rolled sheet so far produced has five triangular ribs, 5/16-inch high, spaced at 2½-inch intervals on one side of a 12-inch wide sheet."

Steel Cold Extruded To Produce Artillery Shells

ROBERT E. DILLON

President, Lake Erie Engineering Corp., Buffalo: "It has been a great many years since we, as manufacturers of all types of hydraulic presses, have had the pleasure of taking part in the development of any metal working processes as important as those occurring at this time.

"Beyond question, the most important and ultimately most far-reaching of these involves the cold extrusion of steel. We have had the pleasure of designing and manufacturing the only hydraulic press thus far built in this country specifically for that purpose. Whereas this is being used under the direction of the Army Ordnance Department for the extrusion of artillery shells, the application of the process to a tremendous variety of products in general, is, in our opinion, certain to expand with reasonable rapidity resulting in outstanding economies in metalworking and resultant reduction in cost, and improvement of quality of end products. We are continuing our research and investigations of such applications, and look forward to even further startling developments in this connection.

"Other new process developments, such as those for deep-drawing, have also occurred during the past year, and hold future promise. However, in our opinion, the

FROM LAMINATIONS TO REFRIGERATOR DOORS... BLISS HAS THE RIGHT PRESS FOR THE JOB

A picture tour of Bliss Presses in action at various General Electric Company plants

Whether your metal-stamping production is large or small, requiring automatic or hand-fed presses...mechanical and hydraulic...Bliss has the right press for your job.

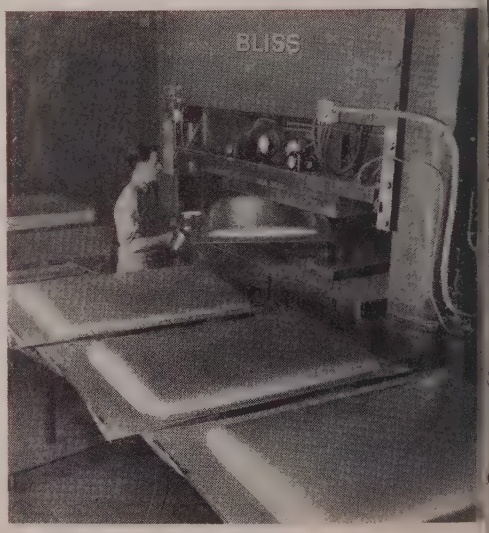
Illustrated here are but a few examples of specially engineered Bliss equipment at work in various General Electric Company plants. Thousands of others are producing profits for leading manufacturers the world over.

For blanking, forming, drawing or squeezing operations, Bliss engineers are equipped to make unbiased analyses and recommendations for proper methods and equipment. Bliss is the only company that builds the complete range of press equipment required by industry.

Next time you need advice on metal-stamping production, call your Bliss representative. Show him your high-cost stampings. Selecting proper equipment and methods is "everyday" business with Bliss engineers, who are skilled in pressed-metal techniques and equipment. There's a good chance that they can give you the right answer.

E. W. BLISS COMPANY, TOLEDO 7, OHIO

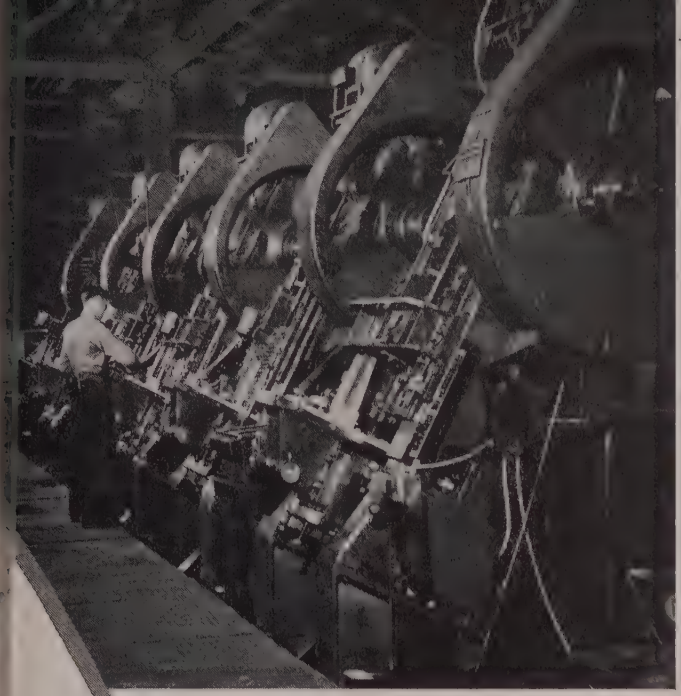
Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery



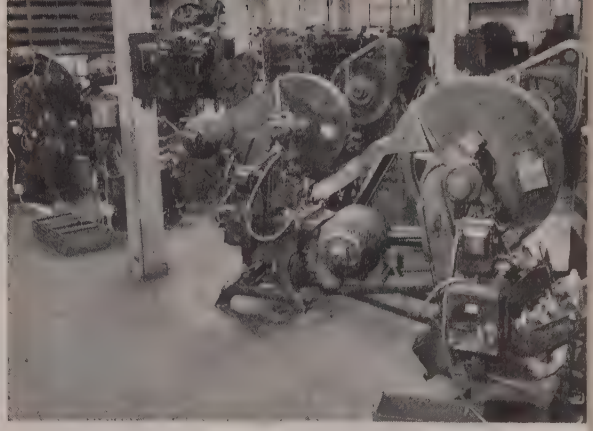
AT ERIE, PENNSYLVANIA: Doors for hom refrigerators are drawn in this 350-ton Bliss "E type straight side press equipped with Bliss-Ma quette die cushions.

BLISS BUILT

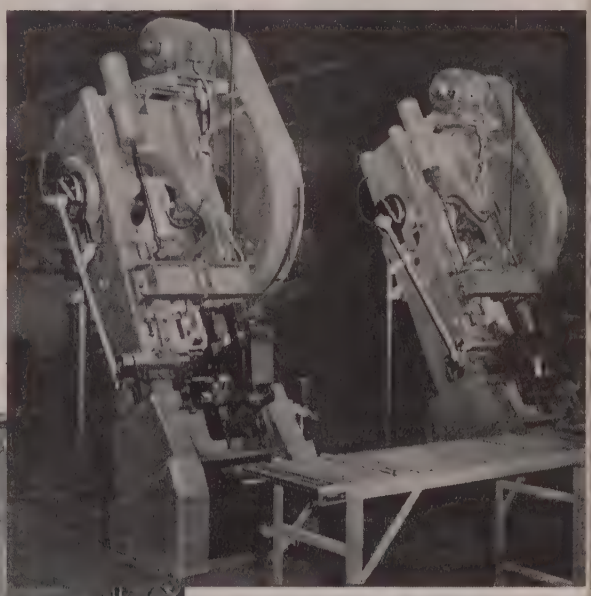
FROM THE RIGHT PRESS FOR A GIVEN JO



AT TIFFIN, OHIO: Hermetic refrigerator motor laminations are repunched at high speeds in two lines of Bliss Special No. 304½ presses.



AT SCHENECTADY, NEW YORK: These batteries o Bliss Inclinable presses are used for a variety of metal-form ing operations.

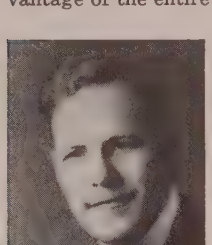


AT SAN JOSE, CALIFORNIA: Two of several specially designed Bliss straight side presses in fixed inclined position have stack feeders. Rigid press construction is vital for precision lamination punching at high speed.

AT DANVILLE, ILLINOIS: Two lines of Bliss High Production presses with progressive dies produce laminations for fluorescent lamp transformers. All were designed with high legs to accommodate material equipment.

TO A COMPLETE PRESS ROOM... It's Bliss

most important development of this period is a broader and more general one. We refer to the increasing realization by producers in the metalworking field as to the advantages and potentialities of hydraulic press application to an ever-broadening range of operations and production problems. Our job shall continue to be centered around a furtherance of such applications to the advantage of the entire industry."



Cold Extruded Steel Cuts Machining on Walled Parts

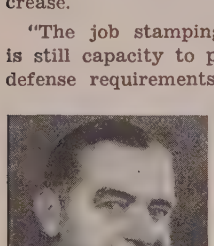
CARTER C. HIGGINS

President and general manager, Worcester Pressed Steel Co., Worcester, Mass.: "Although late 1949 and early 1950 were slack periods for the job stamping industry, and particularly for stampers not connected with the automotive field or located at a distance from steel suppliers, the year registered tooling improvements and technical progress.

"Some of the progress was along the line of working heat resisting alloys, such as rectangular television tube envelopes. These are now spun and then struck rectangular in a press—an interesting example of the team work of two processes. Glass sealing problems are being worked out.

"Cold extrusion of steel slugs seems to be finding its niche and relinquishing some of its glamour as more is learned about it. Desirable physical properties and saving of machine time on walled parts are promised. We have seen a few examples of press working titanium such as for the Army's mortar base; this field will increase.

"The job stamping industry is now busy, but there is still capacity to play a substantial part in producing defense requirements."



Die Forging Industry Booming—Since Korea

ADOLPH O. SCHAEFER

Vice president in charge of engineering and manufacturing, Midvale Co., Nicetown, Philadelphia: "The open-die forging industry found the initial months of 1950 rather drab and uninteresting. Total volume of business was low. The discussions aroused by the introduction of ultrasonic methods of testing had abated somewhat.

"Progress was chiefly devoted to manufacturing efficiencies, individual to various plants, and to the consideration of larger and larger forgings of more highly alloyed special purpose steels such as stainless, elevated temperature steel, etc. Progress along these lines is normal to the industry, and there are always a number of projects in the wind which require forgings in this category. Improvements were almost entirely confined to better handling and better heating.

"The Korean incident has changed all of this. There is an unpleasant familiarity to the adjustments necessary to achieve the most efficient use of scarce alloys. Again, we are seeing drawings of strangely shaped forgings, to be subjected to testing in the most unfavorable locations. Those responsible for the preparation of specifications for the materials have probably not been in constant contact with the producers of those materials. The result is that we have a bridge to gap, and a time limit in which to accomplish it."

Closed Impression Dies Help Save Strategic Alloys

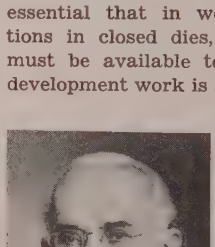
W. NAUJOKS

Special projects engineer, Ladish Co., Cudahy, Wis.: "Most significant, recent, and prospective technical development in the forging field, appears to be the fact that closed impression dies are a valuable aid in saving strategic alloys.

"Shortages in many of the strategic or critical alloys have focused attention on the fact that closed impression dies are proving a very valuable aid in the saving of such alloys, particularly in the so-called 'high density' compositions. At the same time, improved physical properties are imparted to forgings by closed impression dies.

"Development of increased 'thrust' in jet aircraft engines has increased the size of the forged parts which, in turn, increases size in forging stock requirements. Many of the high density compositions must be 'cold worked' at relatively low working temperatures to produce desired physical properties. Use of closed impression dies improves the physical properties and promotes greater uniformity of properties from forging to forging and at the same time reduces the amount of stock required as compared to open die forging. A considerable amount of machining time is also saved.

"Working of high-density alloys in closed impression dies is particularly desirable where sizes are large. Presently it is difficult to obtain uniformly sound material in large cross-section areas in many of the high-density alloys. Confinement of the metal in closed die impressions aids in the enhancement of structural properties. It is essential that in working these high-density compositions in closed dies, sufficient hammer or press power must be available to obtain satisfactory results. Much development work is still to be done."



75,000-Ton Hydraulic Press Seen for Forging Aluminum

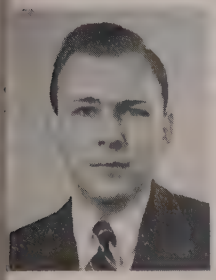
DAVID C. VERSON

President, Verson Allsteel Press Co., Chicago: "We note a significant trend in the field of forging and forming of late. It is the appearance of presses of greater tonnage and size than were ever thought practical heretofore. We have had to revise our standards of thinking in regard to capacity of today's presses.

"A few years ago by normal standards, a 2000-ton press was considered large with certain applications occasionally requiring a larger machine. Now, with the importance of cold forging aluminum and magnesium, and the forming of large diameter steel line pipe, to mention only two specific applications, larger and larger presses are coming into the picture. We now have presses with capacities of 8000 tons, 18,000 tons, with talk of 35,000 and

0,000 tons, and one projected hydraulic forging press f 75,000 tons capacity to produce large aluminum forgngs for the aircraft industry.

"Generally speaking, presses appear to be assuming more important role in the forging industry. For ome twenty years this industry has made an effort to o some forging work on presses instead of board drop ammers, with only moderate success. Large investnents were made in press equipment for this purpose ut die steel would not stand up under repeated strokes n high speed forging presses. This has been largely vercome recently by improved die steels, better work andling methods and lubricants, all adding up to increased use of press equipment."



Roll Forging Gaining Universal Acceptance

R. G. FRIEDMAN

Vice president in charge of engineering, National Machinery Co., Tiffin, O.: "Two significant, basic developments in hot and cold forging are the preforming of forging blanks by rolling, and a new philosophy in nail making. Both developments result in the still greater realization of two basic goals which govern every forging operation: Increased production and reduced waste.

"Roll-forging has been limited until recently by the inability to produce large reductions in area dependably and fast enough to improve upon existing methods of rough-forming the blank for finish-forging.

"Within the past year, our Reduceroll has progressed from its beginning stages and is now becoming standard equipment in leading forge plants. The great number of commercial forgings now being produced on this type unit —railroad, automotive, farm implement and others—indicates its general acceptance.

"Reducerolling is a simple operation which quickly produces uniform descaled blanks for finish-forging on the same heat. Eliminating costly fullering and edging, it substitutes higher output and savings in material due to flash and improved distribution of metal in the finished forging. This relieves the wear-and-tear on expensive forging dies and equipment."

Drop Forging Industry Needs More Skilled Labor

RAYMOND M. SEABURY

Secretary-treasurer, Drop Forging Association, Cleveland: "The drop forging industry, including producers of drop, upset, and press forgings, is currently setting peacetime production records, exceeded only by peak wartime output. Producers report four to five month backlogs throughout the industry, with demand steady at levels higher than usual. Though hampered by the steel situation, forging plants are doing their utmost, and often displaying great resourcefulness, to meet the needs of their customers.

"As yet the impact of DO orders is not strongly felt, but forthcoming defense business may delay some deliveries for civilian purposes, because forgings are essential to many defense products. For this reason some additional plant expansion is planned, supplementing large additions made during the last war and immediately thereafter. Another factor limiting production is shortage of skilled labor. Forging plants require highly skilled and intelligent craftsmen, not only for forging operations, but equally for the related craft of die making. During the recent war women were employed, for personnel work, inspection, laboratory routine, and some skilled jobs, and they will be hired again as necessary, but this only partially fills the gap."

Induction Melting Used For Titanium Production

R. N. BLAKESLEE

Vice president, Ajax Electrothermic Corp., Trenton, N. J.: "It cannot be said that there is anything radically new in induction heating—only that the growth is steady and healthy as the industry gradually expands into this newer and better method of heating. The wartime boom in induction forging equipment did not, as some thought, herald in an immediate new era in forging technique. In fact many of the equipments sold for wartime forging projects found their way to melting applications afterward. Enough were retained for forging however to point up their superiority, and despite the lower cost of fuel heaters the general trend is toward induction heating.

"One of the largest automotive plants in the country recently decided that its new forge plant should use induction heating and we were given the job. It is believed to be the largest peacetime order ever placed in this contry for new induction forging equipment.

"The metal titanium is in the limelight. It is too early yet to say what role it will play in the future, but induction melting, as in nearly all recent metallurgical developments, is being used for the large bulk of the work. Ingots of 650 pounds are being cast regularly by one producer and most of the other companies are turning to induction melting for their production."

Sees Production Trend to Larger Type Forgings

EUGENE C. CLARKE, JR.

Vice president and works manager, Chambersburg Engineering Co., Chambersburg, Pa.: "In all probability no other industry is more keenly aware of the demands of the defense program than the forging industry. Requirements of the program when translated into terms of forgings establish a definite trend towards increasing quantities of larger forgings which, in turn, accents the need for more productive means of making them. Work is already underway to design new equipment to meet this problem.

"Meanwhile, in the gravity drop-hammer field, the air-lift hammer is attaining popularity which is enhanced by the fact that it can be equipped with a selective stroke control making it possible for the hammer-man to strike long or short blows at his option. The emphasis in most shops on hammer maintenance is paying off in increased production and minimum down time. Of course, hammer builders are constantly improving their product in this respect and have made contributions in this field.

"It is interesting to note that the field of impact stamping has been widened to include the manufacture of parts for agricultural implements, silversmithing, forming of television tubes, as well as increased use in aircraft and automotive products."

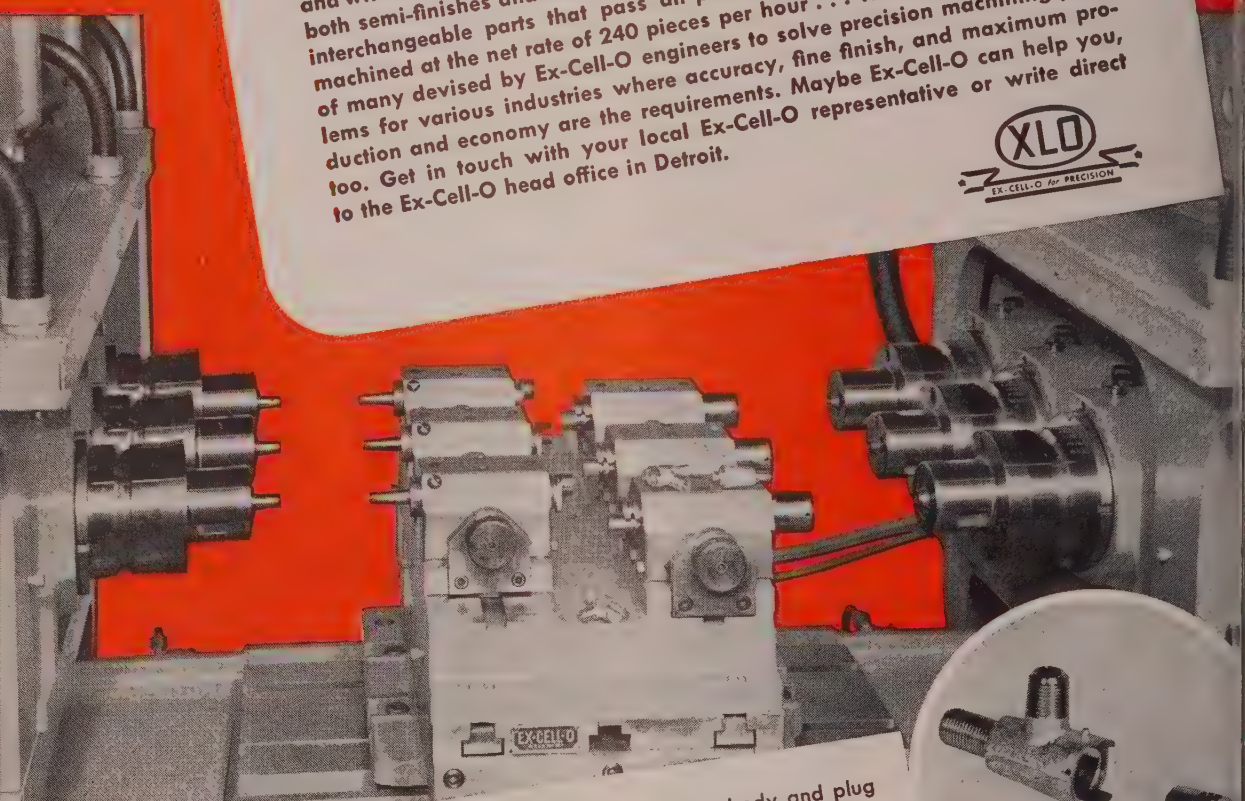
EX-CELL-O

CAN GIVE YOU MORE ECONOMICAL PRODUCTION

. . . for instance:

This view of the tooling on an Ex-Cell-O Precision Boring Machine shows an arrangement for precision taper turning valve plugs (*at left*) and for precision taper boring the mating bodies (*at right*). Plugs and bores must be perfectly round and straight, with tapers matched exactly, and with a mirror-like finish to assure air-tight valves. This Ex-Cell-O machine both semi-finishes and finishes both pieces in one machine cycle, producing interchangeable parts that pass air-pressure tests under water. Parts are machined at the net rate of 240 pieces per hour . . . This operation is typical of many devised by Ex-Cell-O engineers to solve precision machining problems for various industries where accuracy, fine finish, and maximum production and economy are the requirements. Maybe Ex-Cell-O can help you, too. Get in touch with your local Ex-Cell-O representative or write direct to the Ex-Cell-O head office in Detroit.

XLO
EX-CELL-O for PRECISION



In circle to right: Brass valve body and plug finished by precision boring and turning operations on Ex-Cell-O Style 1212-A Standard Double End Precision Boring Machine.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGA

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles

Machining

- MACHINE tool builders no longer try to sell technical progress. Today it is the financial rather than mechanical sales approach — how many dollars can we save you!

- TO MEET the "triple-threat" problems of operators—high labor costs, need for closer tolerances and a probable manpower shortage—builders are having to come up with more automatic operations and controls.

- VERTICAL grinding is the newest one in the bandsaw field. Tool is a steel tape with platforms on the lead edge onto which are molded abrasive hones or grinding stones.

- NATIONAL DEFENSE activity, of uncertain duration to say the least, emphasizes to some the advantages of high-production equipment which might be quickly and easily converted to conventional machine practice.

- PLANERS and boring mills of the heavy-duty type, once considered impractical for carbide tooling, now are using it with coarse feeds and slow speeds.

- MECHANIZATION of tool changing, part inspection and other steps in the machining cycle frequently the cause of lost hours, will bring a consequent step-up in efficiency.

- DEMAND is increasing for air-electric systems of gaging and classifying work having at least one critical dimension on the order of 0.0002-0.0003-inch.

- BROACHING, despite all that may have been claimed for it, is no cure-all for low productivity. Its very speed complicates the problem of getting parts in and out of machines, as well as of removing chips. Answers are suggested, of course.

American Industry Realizes It Must Modernize or Die

HERBERT H. PEASE

President, New Britain Machine Co., New Britain, Conn.: "Forecasters expect 1951 to be a year in which we will try to hang onto our hard-won high standard of living and at the same time back up the United Nations policy of nonaggression. This dual objective requires more than wishful thinking. To make both guns and butter our production facilities will be extended to the limit. Already we are faced with a shortage of manpower and materials.

"Theoretically the machine tool industry suggested the answer to this problem with its 'More Goods, for More People, at Less Cost' theme of its 1947 Chicago Machine Tool Show. Practically the production equipment on display was capable of producing one third again as much as the equipment used during World War II. Just three years later we have many machine tools which can outproduce those at the show. Unquestionably, tools we design tomorrow will outproduce those we are building today.

"I just watched a customer's machine being tested in our final assembly department. It makes a finished piece every 2.6 seconds, or 1366 pieces per hour—twice as fast as the customer's present method. Here then is a specific case of machine tool replacement which will double production. Multiply this by the number of antiquated methods and obsolete machines which should be replaced in many plants. Then you will have a fairly clear idea of the vast possibilities of replacement.

"Fortunately, the campaign for regular replacement schedules which we have been stressing since the war finally is producing results. Recent nationwide trend toward modernization of plant equipment is proof that American industry really believes that it must 'modernize or die.' We have made a start but there is much more to be done. There still are 379,000 obsolete machine tools in use.

"These are millstones around industry's neck. They jeopardize our world position."

More Automation Rejuvenates Basic Machining Operations

O. L. BARD

President, Michigan Tool Co., Detroit: "If current developments in gear production are any criterion, industry generally is headed toward a major modernization of processing methods. In addition to the wide-spread adoption of such basically new operations as the simultaneous form-cutting of all teeth on a gear, the more standard operations are being rejuvenated through greater automation.

"Without making any basic changes in machines, productivity of gear shaving equipment has been practically doubled through the addition of automatic loading and unloading devices. These permit machines to operate on a continuous automatic cycle with practically no time out for loading.

"Automation devices moreover are quite varied, to suit individual conditions. Hopper and magazine feeds with built-in gaging devices for pre-inspection of gears going

Look twice at

Yes! Look at the BROACHING MACHINE

and look at the TIP-DOWN FIXTURE

LAPOINTE Broaching Machines and Tip-Down Fixtur warrant a second look — that is, if you want to increase yo production, improve your quality, and drive down your costs . and do all this with *less operator fatigue and down-time!*

The pictures tell the story. TIP-DOWN FIXTURI shown here, are a Lapointe patent. They provide exceptiona easy loading and unloading by bringing the work-holder out fr *where the operator can see it and get at it.* TIP-DOWN FIXTUR do not sacrifice any of the stroke available on the machine, th permit the use of a great variety of work-holders that can manually or (automatically) hydraulically clamped, they extremely *fast.*

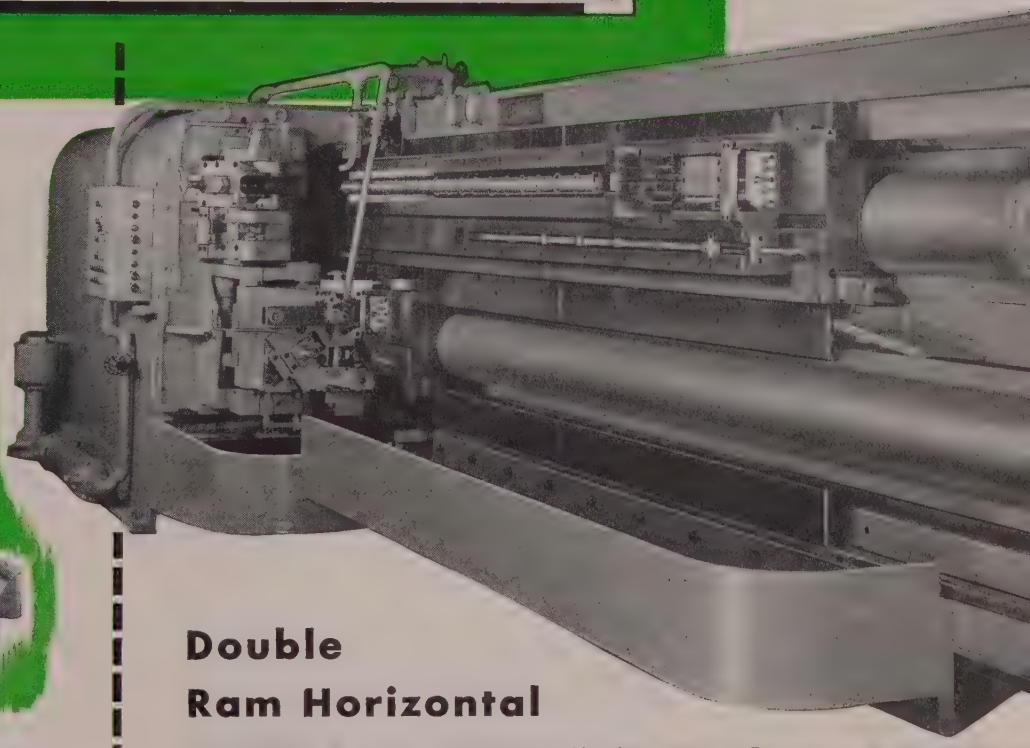
LAPOINTE

Broaching Tools are worth looking at, too!

Ground from special steel meeting our formula requirements, they are said to be the finest broaches that present-day engineering skill can produce. On order, our broaches can be Electrolized to double their life between grinds. (Sometimes it's multiplied by 10!)

Electrolized BROACHES ...exclusive with LAPO

LAPOINTE



Double Ram Horizontal SURFACE BROACHING MACHIN

Where headroom is limited, this horizontal type double ram Surface Broaching Machine will take care of many tough broaching jobs — such as automobile cylinders, connecting rods, and other high production parts. It is built in 15- and 25-ton sizes, with 66-inch, 90-inch, and 120-inch strokes. Rigid, rugged, versatile . . . *and easy to load!* (See those TIP-DOWN Fixtures?)

LAPOINTE has the most economical answer to any broaching problem. And remember: Lapointe can take full responsibility, in both engineering and building the complete job . . . machines, fixtures, and tooling.

Send for "Condensed Catalog No. 3," showing all our machines.

uble Ram Vertical SURFACE OACHING MACHINE

uilable in ten standard sizes from n to 25-ton, and 30-inch to nch strokes, our double ram tical Surface Broaching Machines r maximum production advanes when equipped with TIP-WN Fixtures. Impressive struc-al stability is achieved through design of the massive frame. Low ssure system assures smooth, uble-free operation. Note the *omatic chip conveyor* which allows tinuous operation.

t to JIC standards at no extra cost.

Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

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HUDSON LAPOINTE MASS.

RLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHIN

into the machine are quite popular. So are simple standardized belt-type conveyors which take away the finish-shaved gears without damaging the finely finished surfaces.

"In some cases machines are so conveyorized that parts travel into and out of the equipment on the same conveyor. This procedure is particularly suitable where cluster gears are finished on a battery of interconnected machines."

Emphasis in Machine Design Will Be on Special Models

RALPH J. KRAUT

President, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.: "Although technical progress in the direction of more efficient machine tools will not and cannot stop, nevertheless we are faced today by a completely different situation than existed a year ago. This has been brought about by the Korean War and defense program—domestic and foreign—resulting therefrom.

"Emphasis as I anticipate it for the forseeable future as far as the machine tool industry is concerned will be predominantly on production and still more production. Obviously this will entail freezing of certain designs and elimination of needless extras and frills.

"I foresee considerable confusion and delay before the government and National Production Authority realize the terrific shortage of machine tool capacity. Eventually they will be forced to give us the highest blanket priority, as was done in the previous war situations.

"Despite forthcoming emphasis on purchase and priorities, machine tools and plant facilities, I anticipate considerable engineering activity during this defense program. In the machine tool field special machines will be developed to take care of completely new types of armaments now contemplated, including jet engines, recoilless artillery, supersonic planes and atomic weapons. On standard machine tools, if we are to furnish them in sufficient quantities for the American defense program and for the Western European Mutual Defense Assistance Pact, we must stop engineering development for the time being and freeze our designs. As a matter of fact we even may have to 'back up' somewhat by eliminating needless frills. I believe that products of most machine tool builders will fall in both of the categories just mentioned.

"American machine tools of today are more than one-third more productive than those built during World War II. Certainly they are vastly superior to any produced elsewhere in the world. I believe if we can produce them in sufficient quantity to implement our defense program before it is too late—we can provide the necessary equipment to the Communist challenge."

Broaching Plays Big Role in Automobile Retooling

JOSEPH P. CROSBY

Vice president and sales manager, Lapointe Machine Tool Co., Hudson, Mass.: "Some of the greatest strides in the broaching field in 1950 were in tooling the automotive industry. Development of jet turbines also was extended from the aviation industry to the locomotive and electric fields, with corresponding development of broaching equipment.

"Take the case of our 10-ton 66-inch double ram vertical broaching machine tooled up for broaching a locomotive diesel supercharger wheel and buckets. On the left hand ram the fixture for broaching the dovetail slots in the locomotive diesel supercharger wheel is located on an in-and-out type fixture with indexing mechanism for 55 slots. On the right hand ram two work nests are located on an in-and-out type fixture. One work nest holds the bucket for broaching the dovetail on the root and the other work nest holds the buckets for broaching the ends to length.

"Wheels are loaded by hand and hydraulically clamped and indexed. Each stroke of left hand ram completes one dovetail slot and each stroke of right hand ram completes one bucket. Production is one complete wheel and 55 buckets per hour. Wheel material is 16-25-6 and the blade material is Inconel X.

"Typical of the newer broaching machines that assisted the automobile industry in producing more than ever before, is our 15-ton 66-inch double ram vertical broaching machine for connecting rods and caps. This has an automatic chip conveyor and tipdown fixtures. Work nest for rod and cap is situated for each ram. Machine cuts at 40 feet per minute, producing 288 rods and 288 caps per hour, a total of 576 pieces.

"Fixtures are loaded and unloaded by hand, with automatic locating and clamping. The low pressure system in this broaching machine gives rated tonnage without shock and vibration.

"Another automotive broaching development is our single ram horizontal 15-ton 78-inch stroke machine for broaching main bearing cap clusters. This horizontal machine lends itself to production line technique. Work nest drops to table height for loading the clusters. Clamping is automatic and swing to broaching position is hydraulic. A hold-down cylinder locks work in place.

"Tooling on this machine is 100 per carbide. Carbide tipped bits are followed by solid carbide finishing broaches. Tooling is adjustable to assure maximum life. Production is 137 parts per hour at 80 per cent efficiency. Speeds are up to 40 feet per minute cutting."

Men with Production Know-How Face Heavy Responsibilities

HARRY E. CONRAD

Executive secretary, American Society of Tool Engineers, Detroit: "During World War II, industry—figuratively speaking—had to learn how to ride a bare-back horse around a ring, standing up. This time, industry again has to ride standing up. It's the same ring. The horses are still bare-backed. But there is one difference: We are going to have to learn to ride around with one foot on each of *two* horses.

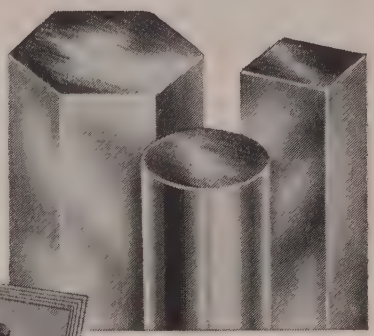
"Our tool engineers, 'the men with the production know-how,' now are once again busily engaged in learning how to 'do the impossible.' They not only have to learn how to keep the domestic economy going with shrinking supplies of manpower and materials but also how to get the defense production machine into high gear at the same time.

"It's a good trick if you can do it. Probably nobody but a tool engineer would even attempt it. Tool engi-

Tough Machining Problems Solved with J&L Cold-Finished JALCASE 10

J&L STEEL

HIGH MECHANICAL AND MACHINABILITY PROPERTIES SAVE TIME AND MONEY... ...PRODUCE BETTER PARTS



Maybe you haven't gotten the word yet, but more and more machinists are "discovering" Jalcase 10 (A.I.S.I. No. C-1144), the top grade of J&L Cold-finished Jalcase. And they're getting good results, too! Here's why.

Jalcase 10 is the highest carbon grade of Jalcase; it has high mechanical and machinability properties. This makes Jalcase 10 ideal for those tough "in between" machining applications. For instance:

Many times the finished-parts specifications on a job call for a high degree of hardness, but not as high as that obtained through heat-treating the finished part. In these applications, manufacturers and machinists have found it profitable to use Jalcase 10 and dispense with the heat-treating altogether.

This saves production time and cuts down on costs. And Jalcase 10's high quality produces a better finish. It's worth your while to try Jalcase 10 on your screw machines.

GET THIS BOOKLET FREE

You'll want more information about Jalcase 10 . . . and the other nine grades of Jalcase. Our booklet entitled "You Can Make Them Better with J & L Cold-finished Jalcase" contains information and technical data to help you produce better parts. This illustrated booklet is yours for the asking. Write today!

MAIL THIS COUPON

Jones & Laughlin Steel Corporation
404 Jones & Laughlin Building
Pittsburgh 30, Pennsylvania

— Please send me a free copy of "You Can Make Them Better with J&L Cold-Finished Jalcase".

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JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L *manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

neers are accustomed to taking on any kind of a production job that is thrown at them. Therefore it practically has become a habit for the rest of us to expect that they will come up with the answer."

Field of Super-Speed Gearing Is Now Being Explored

WALTER P. SCHMITTER

Chief engineer, Falk Corp., Milwaukee: "We have converted substantially our entire line of speed reducers to shaved gearing. In applying the shaving process, we go up to 48-inch diameter. Despite the fact that we very often lap subsequent to this, we find it both economical and justified in view of the superior accuracy obtained for the cost outlay. Our action can probably be interpreted as indicative of a trend.

"It seems to me that fewer manufacturers now are employing flame-hardening for helical and herringbone gearing. Possibly the same trend is going on in the spur gear field. We recently experienced failures on several sets of outside manufactured gears made to interchangeable proportions with our own—which incidentally did not fail. Loading was quite high and necessitated hardnesses higher than ordinarily could be cut after heat treatment. We rough cut in the green, then heat treat, leaving just enough stock for a finishing cut at extreme end of machinability range.

"We completely redesigned our line of Motoreducers several years back. Some of the results have been rather surprising. We have furnished some of these units which operate at 20,000 rpm and we have applied them where extreme quietness was essential, as for instance on motor stairways and escalators. We would not have dared to employ them for such purposes previously. Both housing and sub-frame are completely machined at one setting. Gears are processed with a very high degree of accuracy. It is undoubtedly the combination of these two which makes for these considerably lower sound levels.

"Our most interesting activity has been in the super-speed field where pitchlines in excess of 40,000 feet per minute are involved and where revolutions per minute sometimes go beyond 50,000. Considerable amounts of horsepower are transmitted. Speeds are about twice those considered tops before the war. Unusual techniques and constructions are involved."

"Pilot Part" Acts as Guide On Repetitive Lathe Work

GEORGE HABICHT JR.

President and treasurer, Marshall & Huschart Machinery Co., Chicago: "Recently we installed two tracer-controlled duplicating lathes in a Chicago plant. These are used primarily for machining two ends of an armature shaft used in electric lift trucks. One end is done on one machine, the part then being passed to the next machine for the operations on the other end.

"When a new part is put into production, this quick changeover feature is used. The first new part is machined as a regular engine lathe operation. Then, inserted between template centers, it serves as a pattern for the rest of the lot, the others being produced quickly and accurately by tracer controlled duplication.

"The machines involved are one 14 x 54-inch and one 16 x 78-inch Lodge & Shipley Copymatic. Workpiece is SAE 4140 steel, heat treated to Brinell 277/311. Feed used is 0.0187-inch per revolution. Speed is 451 rpm Tooling is grade K3H Kennametal.

"The operations are as follows: 16-inch Copymatic is used to rough and finish turn and cut thread relief on long end of the armature shaft. The 14-inch Copymatic is used to rough and finish turn and cut thread relief and chamfer the short end."

Hot Spot Machining Applied To High Temperature Alloys

SAM TOUR

Sam Tour & Co. Inc., New York: "As predicted last year we are in an era of increasing productivity of our machine tools. Two approaches to increasing metal removal rates have continued to take the attention of industry.

"Hot spot machining which greatly increases ability of present machine tools to remove metal has intrigued the interest of manufacturers from Massachusetts to California. Work on the refinement of this process to make it a completely practical shop process is continuing. The adaptation of this process to some of the difficult-to-machine alloys required in jet engine, rocket motor, and jet turbine parts allows designers much greater latitude.

"Where new machines are being designed, rigid construction and greatly increased speeds and horsepower are being provided. This allows the use of rotational velocities up to 2000 rpm and cutting speeds of 800 to 1000 surface feet per minute."

Wear-Proofing Rivals Cutting As Big Field for Carbides

K. R. BEARDSLEE

President, Carboloy Co. Inc., Detroit: "Developments in carbides during 1950 properly fell into two main categories: 1. Cutting tools and dies to machine and form parts made of other materials and 2. parts made of carbides in order to resist wear.

"In the tool and die field, ability of carbides to cut costs and increase productivity now is recognized as being due to more than the simple fact that they cut materials faster. This broadened concept prevails in the scores of industrial plants which have, in the past year, installed the Carboloy CCC plan for 'using carbide tools to control production, costs, output, and quality.'

"New developments in carbide tooling have been along several fronts. New types of mechanical tool holders for use with solid carbide bits permit more effective utilization of insert type tools. Carbide broaching on

ain types of jobs is proving highly effective. For nple, on large flat surfaces of cast iron parts such cylinder heads, special broaches made up of single t carbide tools are giving high production at low cost.

Complete screw machine production lines tooled en- ly with carbides have come into being during the t year. New machines are being specifically designed mploy carbides.

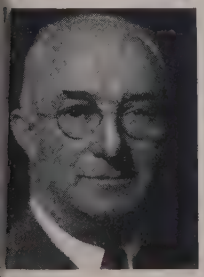
Many manufacturers of stampings are now using oide dies extensively. Typical is the razor blade in- try which has standardized almost entirely on car- dies. Technical developments permitting economi- production of carbide dies with fine, sharp great de- s, makes these metals suitable for use in lettering mps, nameplate and medallion dies, etc. Rods and ing of cemented carbide are being produced to closer rances than previously was possible."

Present Machines Must Serve To Get Defense Work Started

GEO. T. TRUNDLE JR.

President, Trundle Engineering Co., Cleveland: "They tell me that many of today's new machine tools are at least one-third more productive than the models used in World War II. That's fine. t what good will that do you, if you can't get new ma- ne tools in time for the job? Already deliveries are orted in many cases at six months. And the full im- ct of the military preparedness program has not yet gun to be felt.

"The fact is that the major share of the country's oduction job is going to have to be started on exist- g equipment. The problem, therefore, is one of adapt- g existing facilities to the requirements of the work. It's a matter of ingenuity, a problem of improvisation."



Capabilities of Automatics Go Beyond the Conventional

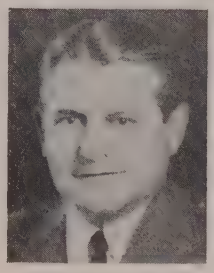
HENRY P. CHAPLIN

President and treasurer, Cone Automatic Machine Co. Inc., Windsor, Vt.: "The horizontal type multiple spindle automatic bar machine produces a larger hourly volume of work per square ot of floor space than does any other type of metal utting lathe. Today, it not only accomplishes the usual ype of operations performed by the hand screw ma- hine, or turret lathe, but also those of unusual types, uch as broaching, burnishing, thread rolling, oil groove olling, heavy knurling, milling and sawing. As radical n adaptation as induction heat treating has also been ccomplished, along with machining, in these automatics.

"On work requiring a minimum of machining, double nd triple setups are often used to produce the same iece, or different pieces, in the same cycle. A differ- nt type of application is the use of 22 tools on a six pindle machine to produce two mating parts in 6 seconds.

"Further adaptation of the machine has been made through work handling devices, all the way from the loading of bar stock into the stock reels to the removal of chips by automatic chip conveyors. Pick-off attachments present work pieces to other operations on the same machine or deliver them to conveyors for secondary operations on other machines.

"Freedom of development of the automatic, through lack of standardization as to type, undoubtedly has had much to do with the present wide range of usefulness of the several domestic brands."



Abrasive Developments Allow More Efficiency in Grinding

FRANK J. TONE JR.

Vice president, Carborundum Co., Niagara Falls, N. Y.: "Long standing trend, greatly accentuated by manufacturing demands in World War II, has been toward higher production through increased cutting rates and improved finishes to closer tolerances. These demands were accelerated after the war and were coupled with an intensified search for lower machining costs. The abrasive industry, working closely with the machine tool industry, has kept pace with this demand by the development of improved abrasive products.

"Recent significiant developments have included use of coated abrasives for automatic and semiautomatic grinding and polishing of flat stock before draw-forming wrenches, tools and products with irregular contours, furniture tubing for chrome flash plate finishes and turbine blades of all types to semiaccurate tolerances.

"Coated abrasives are also being used successfully for manual grinding and polishing of castings, stampings, forgings, extrusions and deep-drawn parts, through the use of backstand and other belt techniques. There is a definite trend toward use of coated abrasives for precision grinding. It is entering the field of grinding titanium alloys and other new metals.

"I predict that one future trend will be in the direction of more automatic applications for both coated and bonded abrasives. Another will be toward development of improved precision methods for manufacture and exact duplication of grinding wheels to withstand higher than present rotative speeds. End results will be greater precision, increased production and lower machining costs."

Automaticity Now Transcends Basic Machining Operations

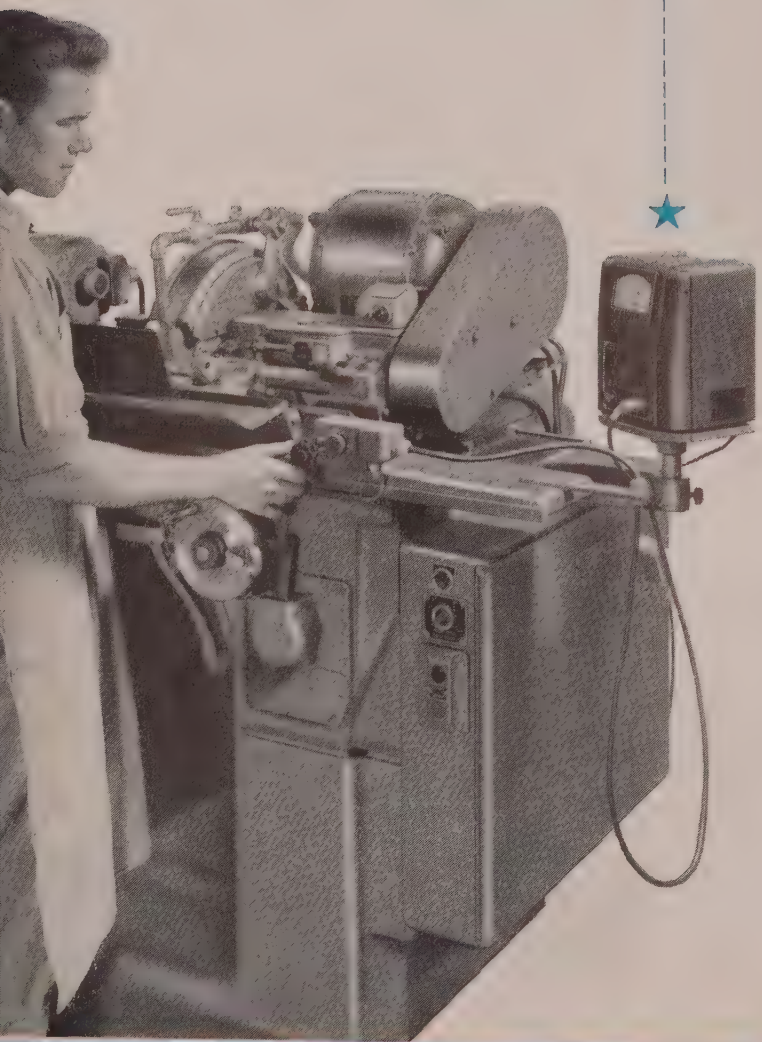
RALPH E. CROSS

Executive vice president, Cross Co., Detroit: "Basic answer to a 'guns and butter' economy is to equip industry solidly with labor-saving machine tools, multiple station machines in particular. In this category are our own 'Transfer-matics' that automatically machine, clean and inspect parts ready for assembly.

"Mechanization of tool changing, part inspection and other predictable operations that ordinarily cause lost machine hours, will increase operating efficiencies of the machines of tomorrow. Some time ago our engineers

a SINGLE trial grind instead of MANY!

with the ELECTRALIGN



Here's the simple set-up procedure for grinding machines equipped with ELECTRALIGN, the exclusive Brown & Sharpe development for swivel table alignment:

(a) *operator inserts piece in grinding machine and makes the usual machine setting . . .*

(b) *preliminary grind is taken . . .*

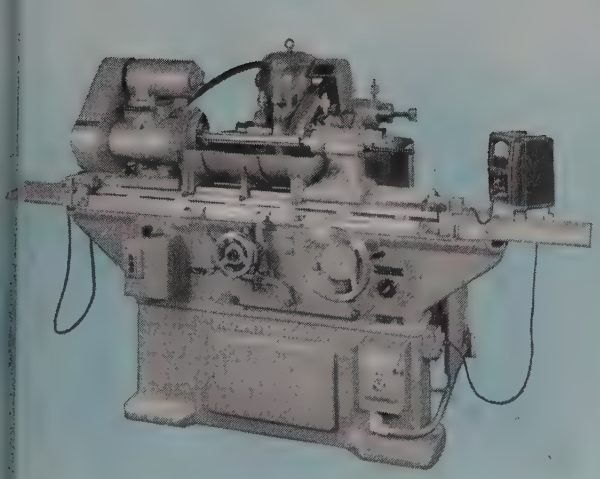
(c) *measurement is made of the amount by which piece deviates from desired straightness or taper . . .*

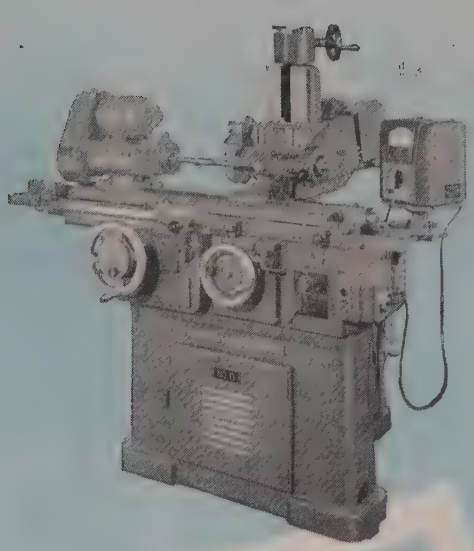
(d) *after the meter pointer has been set to the amount it is desired to swing the work, the operator makes a single positive correction by adjusting the swivel table until ELECTRALIGN needle reads zero . . .*

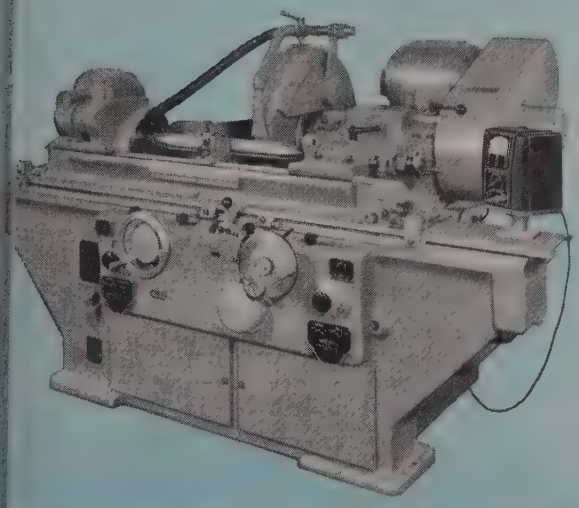
FROM THERE ON . . .

OPERATOR IS PRODUCING

BROWN &







AVAILABLE ON ALL BROWN & SHARPE CYLINDRICAL GRINDING MACHINES

The ELECTRALIGN is available as optional equipment on Brown & Sharpe Cylindrical Grinding Machines: Universal — Nos. 1, 2, 3 and 4 Plain — No. 13 Universal & Tool.

ELECTRONIC ALIGNMENT OF SWIVEL TABLE

Setting the swivel table of a grinding machine to grind a straight shaft or an exact taper always has been a difficult cut-and-try operation. But it needn't be any longer! ELECTRALIGN makes it a simple, quick, direct job by measuring electronically the small angular movement of the grinding machine swivel table relative to the sliding table and magnifying it visually on the amplifier. A single realignment then gives the final precise table setting.

Full specified tolerance for sizing — Electralign makes possible the virtual elimination of taper in a straight piece and allows the operator the full blueprint tolerance for sizing — with resulting lower grinding cost and less scrap.

Recognized as one of the greatest modern advances in grinding, ELECTRALIGN assures important savings in time, money and strain on operators. It speeds production and improves the quality of the product.

For additional details or illustrated Bulletin, write Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

SHARPE B·S

devised an estimating formula and a set of charts for quickly determining predictable machine down-time on a per shift basis. This has been a valuable tool for arriving at the proper combination of operations in the design of our machines and also, for directing our efforts towards the reduction of indirect labor by mechanization.

"As a result we now have the Toolometer to automatically program machine tool changes, preset tools to eliminate the 'cut and try' in tool changing, built-in automatic inspection stations, chip conveyors, telephone systems and lubrication systems; all to keep machines operating the maximum number of hours per shift."

Metallurgists and Engineers Broaden Field for Carbides

PHILIP M. McKENNA

President, Kennametal Inc., Latrobe, Pa.: "An outstanding achievement during 1950 was to extend the practical and profitable scope of applications for cemented carbide tools to many types of jobs heretofore considered impractical for carbide applications. This has been made possible through intensive metallurgical and engineering research. New and improved Kennametal compositions have been developed and distinctive tool designs evolved.

"For heavy duty planer and boring mill work, a tough, strong composition, grade K1, is now available. This insures satisfactory operation on steel and cast iron with deep cuts and coarse feeds at speeds as low as 40 to 60 surface feet per minute. Such operations have in the past been considered impractical for carbides. This new cutting material permits more efficient use of older, heavy, slow speed machines. It gives long tool life, better work and is economical in cost.

"At the other extreme—involving use on the latest types of machine tools designed for high production rates—properties of the harder steel-cutting grades of Kennametal are such that highly satisfactory results are attained at speeds as high as 1200 surface feet per minute on steel."

Unrelenting Effort Goes on To Attain Top Efficiency

WALTER J. GRIMM

Secretary and assistant to general manager, Jones & Lamson Machine Co., Springfield, Vt.: "Our constant aim is to create new tools and methods to produce customers' products better and faster with less physical effort. During the years following the 1947 National Machine Tool Builders' Show engineering and research continued without interruption. As a result, new and improved machines have been added to our line during 1950.

"These include a 2-inch bar capacity ram type turret lathe and a complete line of new No. 7 turret lathes for 2¼, 3, 3½ and 4½-inch bar stock. These offer choice of either fixed center or cross sliding hexagon turrets. All No. 7 turret lathes can be equipped with full length lead screw and sliding gear type quick change gear box complete with single lever thread pitch selector.

"With shortening of work cycles, special attention has been focused on reducing physical labor in feeding and gripping stock. A new hydraulically operated bar feed and chuck is meeting with much favor. Operator fatigue is reduced. He simply pushes a button for opening chuck, feeding stock and closing chuck. Electric torque wrenches are available for operating scroll chucks for all turret lathes."

Line Grinding by Band Tools Offers Important Advantages

LEIGHTON WILKIE

Chairman of the board, DoAll Co., Des Plaines, Ill.: "The contour machine' was the descriptive name which we gave to our metal cutting band saw when it originally was offered—principally for die-making — in 1932. Since then it has gone through evolution that has made this band-type machine a machine tool that has found application in practically every branch of industry.

"As the machine was improved in speed and feed control, the saw blades and other band tools likewise went through revolutionary improvements. There are now 2 different types of band tools available for the contour machine. Every solid substance on earth now can be machined through the medium of this band cutting technique.

"One of the latest and most interesting of our band tools does 'vertical grinding.' This tool is a steel tape with platforms on the lead edge onto which are molded abrasive hones or grinding stones. This band is operated in the precision band machine in the same manner as is a saw blade. This band grinding tool does grinding on a vertical line. The conventional abrasive wheel grinder performs its work, tangent to the wheel, at only one point."

Lapping and Gaging Systems Are Noteworthy Developments

FREDERICK S. BLACKALL

President and treasurer, Taft-Peirce Mfg. Co., Woonsocket, R. I.: "Among notable developments in the mechanical field to which our company has made contributions during 1950, are those concerned with automatic and semiautomatic inspection methods in connection with mass production operations.

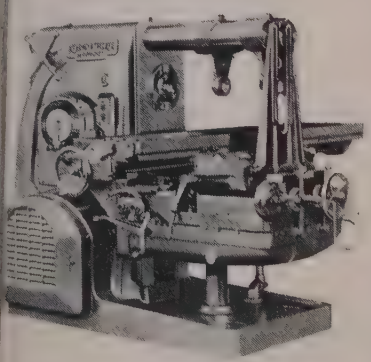
"Recently we have encountered an increasing demand for air-electric systems for gaging and classifying work having at least one critical dimension held to a close tolerance. Usually limits are of the order of 0.0002 or 0.0003-inch. Normally such parts can be controlled safely for proper and exacting assembly only by 100 per cent inspection.

"Nature of a part determines whether it can be inspected automatically or semiautomatically. When it is of simple form, such as pin or cylinder, a fully automatic machine can be used. In this the pieces are hopper-fed, classified to size and deposited in appropriate receivers. This type of inspection is sometimes supplied as a direct attachment to a machine tool with automatic loading

GREATER RIGIDITY

New CK columns give you extreme Rigidity — provide a backbone structure far stronger than any you've ever known. Compared to former columns, they give you 1000 pounds more of dense, high-test iron scientifically distributed in close heavy section ribbing, in box-type sponson construction — built to absorb the heaviest cutting loads.

A new line of knee-type milling machines KEARNEY & TRECKER MILWAUKEE CK's



New Model CK
25 hp No. 5 Plain Style
Milling Machine

YES, Kearney & Trecker's new CK milling machines are packed with design and operating features that make them *more productive, more profitable for you.*

Spindle-mounted flywheel, broad feed and speed ranges and greater horsepower with separate motor drives for spindle, and feed and rapid traverse, mean you get fullest possible benefit from modern cutting tools.

New design 2" diam. table feed screw affords greater bearing contact between screw and nut and is equipped with positive-acting backlash eliminator. These features guarantee smoother feed for conventional and climb milling, give you longer screw life and greater accuracy.

For greater production, these machines are equipped with Kearney & Trecker's famous Mono-Level Control that shortens floor-to-floor time, and materially reduces operator fatigue. New, non-glare micrometer dials help avoid costly errors in reading . . . give you a positive lock at every setting.

Automatic flood lubrication in column and knee and positive metered lubrication to table and saddle, plus generously proportioned gears and shafts assure you greater machine life.

Find out for yourself about Kearney & Trecker's new CK line of knee type milling machines . . . how they meet every demand of modern milling practice . . . how they can give you greater production at greater profit.

Sizes are No. 2, 3, 4, 5, and 6 . . . Plain and Universal styles. For complete details, contact your nearest representative or write direct. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

REPLACEMENT OF OBSOLETE MACHINE TOOLS
IS AN INVESTMENT THAT MAKES BOTH DOLLARS AND SENSE

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

features, thus permitting work to be inspected right after machining.

"For work of more complex nature, such as odd-shaped pieces with perhaps several dimensions which require checking, inspection procedure is usually semiautomatic. In this case operator is required to manipulate the gaging device. The gage then automatically registers sizes concerned—either separately or simultaneously—for each part.

"To speed up this semiautomatic inspection, signal lights usually are employed either in conjunction with air or electric gaging circuits. They enable the operator to determine at a glance the status of classification. It is preferable in most instances to have both signal lights and a dial for complete inspection. Since measurements by air can be effected without benefit of contact points, the air-electric combination is being adopted widely for both automatic and semiautomatic systems."

Duplicating Lathes Conserve Material

ALFRED KULLMAN

Vice president and works manager, American Tool Works Co., Cincinnati: "Accelerated demand for production equipment occasioned by activating of contracts for defense materiel has focussed the spotlight upon advantages of the comparatively new duplicating technique for production machining.

"Low production cost, while of major importance, is by no means the only feature with a valid claim for recognition. The fact that national defense activity may be of uncertain duration, emphasizes desirability of installing equipment of high productivity which possesses the added characteristic of easy and quick conversion to conventional machine practice.

"Another advantage of the duplicating lathe is its ability to conserve materials when material costs are increasing and shortages are looming. Due to the high degree of automatic functioning of the duplicating lathe, operator responsibility for accuracy and quality is largely transferred to the machine, resulting in minimum of spoilage and rejections."

Broaching Not a Panacea for Low Productivity Ills

HARRY GOTBERG

Vice president, Colonial Broach Co., Detroit: "Current enthusiasm for adoption of the broaching process to replace other methods of chip removal in all kinds of operations is so keen that it might not be amiss to temper it somewhat with common sense.

"It is true that industry has been learning only lately just what broaching can do in increasing productivity in the manufacture of all kinds of parts. Broaching equipment and tools are inherently more costly initially than equipment performing similar functions on a lower productivity level. It is natural therefore that top management should have been hesitant about applying the process promiscuously.

"At present, however, the tendency seems to be to go somewhat overboard in the other direction. Broaching is not a panacea for all low productivity ills. The fact that it has been and is currently doing so spectacular a job in reducing costs and increasing productivity of parts for automatic transmissions, agricultural equipment, and similar products does not mean that it will do an equally spectacular job in every application.

"As a matter of fact its inherent asset—extreme productivity—in itself presents a whole set of problems. One of these is materials handling. Broaching is so fast that we frequently have difficulties not only in getting parts into and out of the machines but even in getting rid of the chips produced. To solve this type of problem we have been developing magazine-feed and other semiautomatic loading devices. We have added automatic parts ejection and unloading conveyors. We have developed efficient chip conveyors which remove the chips as fast as they are produced."

Government Should Lower Depreciation Allowances

HERBERT L. TIGGES

Vice president, Baker Brothers; chairman, Machine Tool Industry Mobilization Reserve Group and president, American Society of Tool Engineers, Detroit: "The past year was marked by a start in what is to be hoped will become a widespread 'equipment-rejuvenation' program in industry generally.

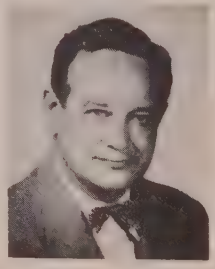
"The modernization job which faces industry is more severe than generally recognized. Every recent study has indicated that there has been a steady increase in the number and percentage of industrial machines which have become or are rapidly becoming obsolete.

"Advances in machine tool performance have been so marked since the beginning of World War II that industry has not been able to assimilate readily the higher levels of manufacturing efficiency now possible.

"Yet our economic welfare demands that we do so. Our national wealth—our industrial strength—is not and cannot be measured by the number of automobiles, refrigerators, radios and television sets in use at any one time. It can be measured only in terms of our ability to continue to produce such things on a basis that makes mass consumption and ownership increase.

"As individual income rises on the one hand, and cost of manufactured products on the other, mechanical modernization is the only modifying factor which can maintain the balance in favor of a healthy industrial growth.

"Finally, government can be of tremendous assistance simply by lightening the economic burden of low depreciation allowances—allowances out of step with the rate at which equipment is becoming economically obsolete."



Rubber Chemists' Researches Make Hydraulic Units Better

D. W. HOLMES

Vice president, Parker Appliance Co., Cleveland: "In the metal-working field as in many other areas of industry, hydraulics has in each succeeding year assumed a more important place in the production picture. One of the many factors behind this growth has been the intensive study in recent years of rubber chemistry as applied to O-ring compounds, so as to extract the most in versatility and dependability

these useful seals.

With this concentrated study has come understanding that a given rubber mixture which performs well with one type of hydraulic oil or in a given application, will shrink or swell excessively when used with another oil or under other conditions. We have a firmer grasp on problems of rubber aging and of keeping rubber elastic at temperature extremes. Hence, O-rings with better performance and longer life. Result: Better hydraulic seals."

Hydraulic Slotter Features Constant Full Power Stroke

H. B. NEWTON

President, Rockford Machine Tool Co., Rockford, Ill.: "One of our important machine tool developments completed during the past year is the model SA Rockford hydraulic slotter. This machine embodies a powerful hydraulic fulcrum drive to the ram, which one of several outstanding features. This new ram drive gives a constant full-power stroke for greater cutting capacity. Cutting speeds range from 25 to 100 feet per minute with a 2 to 1 ratio between the return and cutting speeds. Any cutting speed within this range is quickly attained through simple adjustment.

"Another feature is a mechanically balanced ram which can be tilted up to 10 degrees. The machine has pendant control of cutting speed changes, hydraulic feeds and power rapid traverse in all directions, and facilities for stroke length adjustment when the ram is in motion. A dividing head is part of its standard equipment and the slotter can be built with a traveling column for greater capacity."

Foresee Customer Problems—Build Machines To Meet Them

KIRKE W. CONNOR

President, Micromatic Hone Corp., Detroit: "A machine tool builder continually must study the industries he serves. He must foresee problems that are going to confront his customers. He must design equipment that will enable manufacturers to meet these problems.

"Today, industry is faced with a problem that involves three factors, namely: 1. Increased labor costs; 2, closer tolerances required by improved design of component parts; 3. Threat of man-power shortage.

"This triple threat can and is being met by machine tool builders by designing better, more automatic equipment. Cost of manufacturing any part can be kept down in spite of labor costs if each hour of human effort expended is made relatively more productive. Closer tolerances can be held if human errors are eliminated.

"Automatic controls built into the machine make this possible. Effects of man-power shortage can be minimized by machine tools that reduce the number of hand operations and handling required on each part.

"Foreseeing these things, Mircomatic Hone Corp. has just developed a high-production, high-precision electronically controlled multiple-spindle honing machine that more than doubles production on many parts. Several automotive manufacturers have purchased these machines for honing connecting rods.

"Six spindles are mounted on a rotating base. Each spindle is controlled by a separate 'Microsize' unit. Operator loads and unloads the rods into fixtures as they move past him. In this way—with only one operator—from 700 to 1000 rods per hour can be honed."

Cites Need for Published Machine Design Practice

A. P. YOUNG

Head of the Department of Mechanical Engineering, Michigan College of Mining and Technology, Houghton, Mich.: "This year we introduced a new optional course —Machine Design. Inquiries sent to publishers revealed the fact that there is no text available under one cover concerning advanced machine design. Thus all lectures and material presented to the class must be obtained piecemeal from periodicals, books and experience. Some information on the latest practices developed and used by designers is occasionally obtained from periodicals, but the entire field of design is not covered.

"Several texts are available on casting practice and design for casting, welding and design for welding, but these are a year or more behind. If designers in industry would publish short articles on recent design practices in those periodicals which come to the desks of college professors who teach design, it would be an immense help in presenting a course in machine design."

"Impossible" Cutting Speeds—Now A Reality

WILLIAM L. DOLLE

President and general manager, Lodge & Shipley Co., Cincinnati: "Any comments I might be tempted to make on recently past developments would seem to be superfluous. These have been pretty well cataloged and written up in various magazines interested in these subjects. Any one who is vitally interested in machine tools and tooling keeps reading these and so keeps fully abreast of current trends.

"However, the field of prospective developments presents an entirely new vista. We know that experiments are being made along a number of lines, particularly those concerned with advancement of faster machining which eventually results in lowered manufacturing hours. Cutting speeds are being achieved which only a short time ago were thought of as impossible. It is not unusual to hear these referred to as 'supersonic' speeds."

Big Machine Tools Evolved To Meet New Needs

ALFRED TROSCH

Vice president, Consolidated Machine Tool Corp., Rochester, N. Y.: "Designing of any large machine tool requires first, thorough knowledge of the customer's requirements. One of the most important stages in its development is preparation of the preliminary design, known as the preliminary layout. This must be based upon sound and practical engineering experience, keeping in mind size and type of equipment available for handling

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MORSE MEANS *MORE* PRODUCTION . . . smoother, more accurate production . . . with every type of cutting tool from drills, reamers, taps and dies, to end mills, milling cutters, slitting saws and "specials."

And Morse Quality is steadily being advanced by Morse Engineering and Research . . . as you would expect of the company that originated and developed the twist drill.

That's why, on every cutting tool order, it's good business to specify "MORSE" and shoot it in to your Morse-Franchised Distributor. And if you want still *higher* production, specify "MORSE Electrolized."

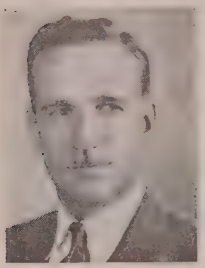
Morse Twist Drill and Machine Co., New Bedford, Mass. (Div. of Van Norman Co.)
Branch Warehouses in New York, Detroit, Chicago, San Francisco

MORSE

such work, careful consideration being given to cost of production and the resultant selling price.

"After the preliminary design has been approved and the order placed in production, final designing, detailing and other necessary engineering work must of course be completed.

"This type of machine is exemplified by the Betts special vertical boring machine, for boring, facing and drilling of large welded steel generator stator frames, the work being held in a vertical position. This position facilitates set-up time, eliminates auxiliary equipment and inherent inaccuracies."



Induction Hardening Affects Product Design

W. G. WALTERMIRE

Chief products engineer, Lamson & Sessions Co., Cleveland: "Cold heading tools of carbide are definitely on the increase and there are more and more small companies manufacturing header dies, boltmaker dies and finishing hammers. Development of upset hammers is slow and will be unless, and until, first and second blow parts are standardized.

"Increasingly more work is originated on cold headers and finished on second operation equipment, special purpose automatics as well as screw machines and others. Increasing use of induction hardening is also affecting product design and companies in the screw and bolt industries are studying other applications for induction heating techniques.

"Our industry is becoming a progressively larger factor in the rearmament program and production of war materials is increasing. The screw and bolt producers are working with the Armed Services and the consuming industries to modernize product requirements with emphasis on usage and modern methods of production.

"Two years ago the unified screw thread agreement was reached with England and Canada. Today this thead is in widespread use. Agreements are in the making now to agree on unified dimensions and proportions for major types of products using the threads. Threads under ¼-inch are also being unified.

"Considerable progress is being made on establishing recognized grades of physical properties applicable to screws, bolts, nuts and similar fasteners."

Supremacy in Machine Tools Is a Great National Asset

JEROME A. RATERMAN

President, Monarch Machine Tool Co., Sidney, O.: "As we face once more the prospect of returning to an 'arsenal economy,' it is reassuring to know that technical developments of the past five years have so increased productivity of many machine tools that plants farsighted enough to have installed them already are in an excellent state of preparedness.

"Our own Motor Trace control is a case in point. An outgrowth of wartime developments in electronics plus basic knowledge of automatic sizing principles, this device gives to a wide range of new Monarch engine lathes a completely automatic cycle. By that I mean automatic feed control, infinitely variable feeds and rapid traverse from one diameter to the next.

"In many instances, one operator can handle two machines so equipped, and can do so with less fatigue than he would experience with one manually controlled lathe. Time-saving, especially on short runs is so pronounced as to be an important factor in stepping up production and cutting cost."

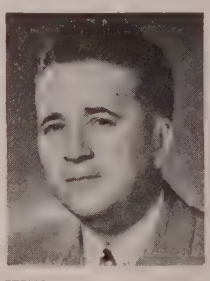
Emphasis on "Dollar Saving" Promotes Machine Tool Sales

TELL BERNA

General manager, National Machine Tool Builders' Association, Cleveland: "An old story popular in advertising circles concerns a soap manufacturer who made good soap but didn't have the knack of selling it. Finally, along came a salesman who said, 'You're not selling what people are buying. You are trying to sell soap, but what women will buy is white hands.' Whereupon the manufacturer advertised 'white hands,' and he sold soap!

"There is a perfect parallel in the machine tool industry. Technical progress in our industry continues to be remarkable. It *has* to be because this industry must rapidly obsolete its own models in order to stay in business. But technical progress is not what manufacturers are buying. They are buying *dollars saved.*

"For years, machine tool builders tried to sell technical progress. Now they are learning to sell dollars saved—and that's what makes a sale. How to reinforce the 'mechanical sales approach' with the 'financial sales approach,' has been one of the great subjects of sales education within the machine tool industry during the last two years. Accomplishments along those lines represent the most constructive recent developments."



Faster, Better Gear-Making Will Aid Armament Program

WALTER S. PRAEG

President, National Broach & Machine Co., Detroit: "Another national emergency has arisen. We are under patriotic obligation to produce machines and parts fast enough to meet the emergency. With a backlog that stands at an all-time high, this is a big order—but it can and will be done.

"Here at National Broach & Machine Co. we have per cent more capacity than we had at the outset of World War II. We have learned much since then about faster production methods and with higher quality control. Specifically, we have developed automatic loading for gear shaving machines which has increased their capacity in some cases by as much as 500 per cent and—at the same time—has greatly reduced the importance of the human factor in gear finishing.

"Another of our projects which will materially aid the rearmament program, was undertaken in answer to industry's insistent demand for better and faster gear roughing with simple, inexpensive tooling and better all-around control. After several years of experimental work we now have in the final stages of development, gear roughing equipment of greatly simplified design."

Surface Treatment

POLISHING steel in the flat, followed by coating, either the phosphate type or soluble plastic, minimizes scratches in handling and forming before final plating, and at the same time reduces die costs and avoids manual buffing operations.

COMBINED use of organic coatings and plating is suggested as a means of conserving plating metals in short supply.

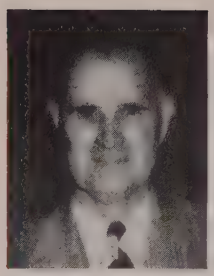
HIGH-SPEED chromium bath, with self-regulation, is hailed by its sponsors as the first major advance in chrome plating in a quarter-century.

STEEL SHOT, either cast and heat treated or cut wire, plus new blasting techniques, hints the possibility of complete mechanical cleaning lines for strip, plate, rod and bar stock.

PORCELAIN enameling plants continue to push research programs toward objectives of lower firing temperatures and reduced coating thickness. Obvious reason: Cost. Less obvious: Reduced warpage and susceptibility to damage.

CHEMICAL coatings for aluminum show promise as prepaint treatments, although there is room for improvement.

COLORING of galvanized coatings is under study, with the idea of creating new product appeal. For instance: Pastel galvanized fences around country estates, rose-colored garbage pails.



Refractory Lining Boosts Galvanizing Pot Life

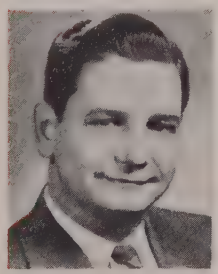
WALLACE G. IMHOFF

President, Wallace G. Imhoff Co., Encino, California: "Technical developments in the field of hot dip galvanizing during the past year are strikingly shown in the new continuous galvanizing lines of the Carnegie-Illinois Steel Corp. at their Irvin works and at the Gary Sheet and Tin Mill. Continuous galvanizing in both the fields of strip and hot water heater tanks has greatly increased production; the new line at Gary has a production capacity of 60,000 tons of coiled product a year.

"A number of other technical developments of great interest and importance are still in the development stage. An idea of special interest is attaching a very thin refractory lining to the inside walls of the firebox steel galvanizing pot for the purpose of increasing the pot's life and service, and to eliminate all iron dissolved from the pot itself, thereby reducing dross production by the elimination of that much iron. The special advantage of this thin refractory lining is that it is applied cold, to any portion of the pot or only to the area where corrosion is severe.

"Still other developments in progress are: An entirely new method of drossing the pot that does not require a drossing spoon, and uses almost no labor; a special type of electromagnet that can be used to sweep across the top of the dross and pick up lost articles such as pole-line hardware and malleable iron pipe fittings. Instead of allowing these articles to produce enormous amounts of dross by staying in the bath until the pot is drossed, they can be taken out every night after operations by the magnet.

"Still another development which has been under consideration and study is the coloring of galvanized coatings."



Steel Abrasive Broadens Blast Cleaning Field

C. R. CLINE

Engineering assistant to the president, American Wheelabrator & Equipment Corp., Mishawaka, Ind.: "The field of blast cleaning has been broadened through the use of steel abrasive in place of the older iron-types. Steel shot which has been heat-treated for proper hardness or in some instances a steel grit, plus the introduction of new blasting techniques, has shown sufficient merit that we can now look forward to the possibility of complete mechanical cleaning lines for carbon strip, plate, rod and bar stock. Heretofore many steel mills have had reservations about mechanical blast cleaning because of possible imbedment of hard and brittle abrasive particles into the surface of soft carbon steels. Indications are that this disadvantage has now been overcome by these later developments.

"In addition to improved quality of the blasted product, continuous blast cleaning production lines can now be operated with appreciably lower operating and maintenance cost than before. Steel shot has a much longer life before breaking into useless fines than chilled iron abrasive but of particular importance to steel men, it

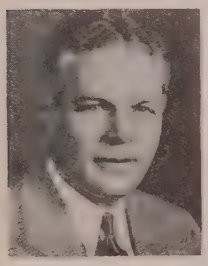
causes less wear on machine parts. This permits higher tonnages because of less down time for maintenance."

New Metal Analysis Ideal For Galvanizing Kettles

W. H. SPOWERS, JR.

Consulting engineer, New York: "A new development of extreme importance to all galvanizers will shortly be announced. The announcement will have to do with a new type of galvanizing kettle, which is being planned for installation in the galvanizing departments of several large operators.

"The constant renewal of galvanizing kettles, made necessary by deterioration of the usual fire box steel construction, has been a great source of annoyance and expense to the industry since the beginning of the art. Because of this steady deterioration, expensive dross losses and costly reinstallation charges have been unavoidable and temperatures have been definitely limited, although it has been recognized that even slightly higher temperatures than have been heretofore practical would yield more ductile coats."



Automatic Polishing Before Forming Cuts Costs

V. M. DARSEY

Vice chairman of the board, Parker Rust Proof Co., Detroit: "Metal polishing and buffing accounts for a substantial part of the cost in the production of electroplated articles. A recent development is the automatic polishing of steel in the flat, followed by a Bonderite coating and lubrication to protect the polished surface during forming operations. Combination of Bonderite coated steel and suitable lubricant eliminates scratches in forming bumpers from polished steel by providing a uniform and continuous film of lubricant over the surface, thus reducing metal-to-metal contact in forming, resulting in: Lower die costs, less down time on presses, increased production and fewer rejects.

"Following the forming operation, the lubricant and Bonderite coating is removed from the polished steel surface before plating. Production experience in a large automobile plant has shown a polishing cost of 0.6 cent per square foot for bumpers manufactured from flat polished Bonderite coated steel, compared to a cost of 9 cents per square foot for other procedures."

High Production Sought by Porcelain Enamelers

B. J. SWEO

Director of ceramic research, Ferro Enamel Corp., Cleveland: "With the extreme demand for consumer goods particularly in the home appliance field, the emphasis of the porcelain enamel industry has been on production. The industry over the years has been characterized by the close co-operation of steel producers, producers of porcelain enamel frit and makers of finished porcelain enameled ware.

"The trend to high production is readily noticeable in the expansion of facilities for producing finished enamel ware. Not only have existing facilities been expanded but construction of new plants is proceeding at an unprecedented rate. Suppliers of porcelain enamel frit have been required to expand their operations to meet the demand.

"There has been a strong tendency to increase output of existing equipment by improvement in methods of processing, particularly in speeding up the enamel firing operation which is generally the bottleneck in plant operating at above rated capacity levels. To aid this increase in tempo, frit producers have supplied enamels to the trade which mature at temperatures below the conventional 1500-1550° F levels. Enameling plants continued to fire at the conventional temperatures but reduced the firing time appreciably. Without sacrificing quality they were able to increase production markedly.

High Corrosion Resistance Obtained by Tin-Zinc Plating

RICHARD O. LOENGARD

President, United Chromium Inc, New York: "In the field of chromium plating, 1950 has seen the wide-spread adoption of the high speed chromium plating bath with self-regulation, the first major improvement of the conventional plating bath which has been in general use since 1926. These improvements also made possible the increased use of barrel plating for finishing small articles with chromium efficiently.

"There has been continued research and investigation of improved methods of providing corrosion resistance and decoration on metals, involving the use of plating processes, conversion coatings and organic finishes, with increased realization of how these various finishes can be used separately and in conjunction with one another to produce an improved end product and to facilitate the employment of various basis metals so as to best utilize their inherent characteristics. Examples are protective coatings for magnesium and aluminum, a combined use of organic coatings and plating to conserve metals in short supply.

"There should also be noted the interest in tin-zinc alloy deposits as a substitute for cadmium where corrosion resistance is of maximum importance."

Bright Nickel Plating Continues To Gain Ground

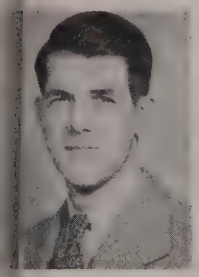
C. B. F. YOUNG

National Southern Products Corp., New York: "The year 1950 has seen the field of metal finishing continue on with progress. The first portion was beset with some what falling prices, especially in the jewelry and ornamental, decorative fields. Here the metal finisher was endeavoring to get high quality again at low cost.

"With the last part of the year, however, there has been a general swing towards more production and reducing costs. In general more emphasis is being placed on the preparation of metal surfaces prior to the finishing techniques being applied. Thus, quite a bit of attention is now being placed on the grinding, polishing oper-

d so that a minimum amount of pores result. This, of course, produces fewer rejects.

The field of bright nickel continues to gain ground. ter bright plates used in decorating things are another e. Bright copper is an example. All of these tend ower labor costs and step up operations."



Program for Safe Ceramic Transit Widely Accepted

W. A. DERINGER

Director of ceramic research and development, A. O. Smith Corp., Milwaukee: "Two important developments in the porcelain enamel field are worthy of consideration: National safe transit program and tionship of steel base to porcelain enamel coating.

The National Safe Transit Committee was formed in 18 and made considerable progress in 1949, but made lf felt throughout the industry in 1950. The program ich was initiated to cut down shipping loss of porcein enameled products, has now been widely accepted l approved by manufacturers of enameled products, ton and crate suppliers, and by all of the common riers as well. The program has effected a pronounced uction in shipping losses and has served to assure that celain enamel products will safely make the trip from e assembly line to the final customer."

Zinc Supply is Matter Of Prime Interest Today

ERNEST V. GENT

Executive vice president, American Zinc Institute Inc., New York: "In the field of metallic coatings, zinc is maintaining its predominant position, with 1950 galvanizing operations headed for an all-ne high record in terms of zinc consumption. The same true of zinc in die castings.

"The steady improvement in techniques involved in lvanizing operations and die casting practice is imrtant to record; but under current conditions, the atter of prime interest is the question of zinc supply.

"Slab zinc production in 1950 will show some increase er the previous year, and sufficient to balance the nprecedented expansion of civilian consumption plus ie needs for the defense effort as currently known. But ie channeling of substantial supplies to the national ockpile imposes an additional load which cannot be bsorbed without curtailment in one direction or another."

hemical Brightening of Aluminum Offers Economy

ANA W. SMITH

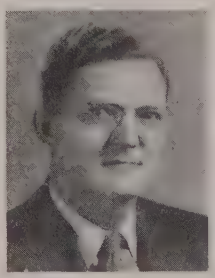
hief metallurgist, division of metallurgical research, aiser Aluminum & Chemical Corp., Spokane, Wash.: The continually expanding uses to which aluminum and ts alloys are being put focus considerable attention on levelopment of improved methods of finishing these maerials.

"Developments are being directed toward finishes lesigned to resist extraordinary corrosive conditions, to elation of steel base to porcelain enamel coating.

"The Glenn L. Martin Co. announced their MHC coating for aluminum. This coating, which is produced electrochemically, displays a high resistance to abrasion and is finding use on various wearing surfaces.

"Several developments concerning chemical coatings for aluminum are showing considerable promise as prepaint treatments although much room for improvement remains. The so-called wash-primers, as undercoats for paints and baking enamels, are being used in the production of painted aluminum articles.

"In the field of decorative finishing there is keen interest in recently developed chemical brightening solutions which offer significant economies over the older electrochemical methods of brightening aluminum articles while giving equivalent finishing quality."



Galvanized Coatings Put Under X-Ray Analysis

R. E. BYRD

President, American Hot Dip Galvanizers Association Inc., Pittsburgh: "From 'A' to 'X' the American Hot Dip Galvanizers Association has made significant progress in 1950 and has its sights on even greater achievements in the coming months. A growing membership can only progress if every member is active.

"To begin with, 'A' represents the active association members. The members make up the personnel of the association committees who are organized to do specific jobs. These committees have come up with results beneficial to the entire membership. From promotion to plant safety, from practical investigation into galvanizing problems to a close contact with the zinc situation, from specifications to new methods and equipment these committees have done a real job.

"'X' stands for x-ray, at least with this association. The quality control committee, one of our major committees, used x-ray investigations of galvanized coatings on all types of galvanized products. The quality control committee is at present conducting a series of tests with special testing equipment."

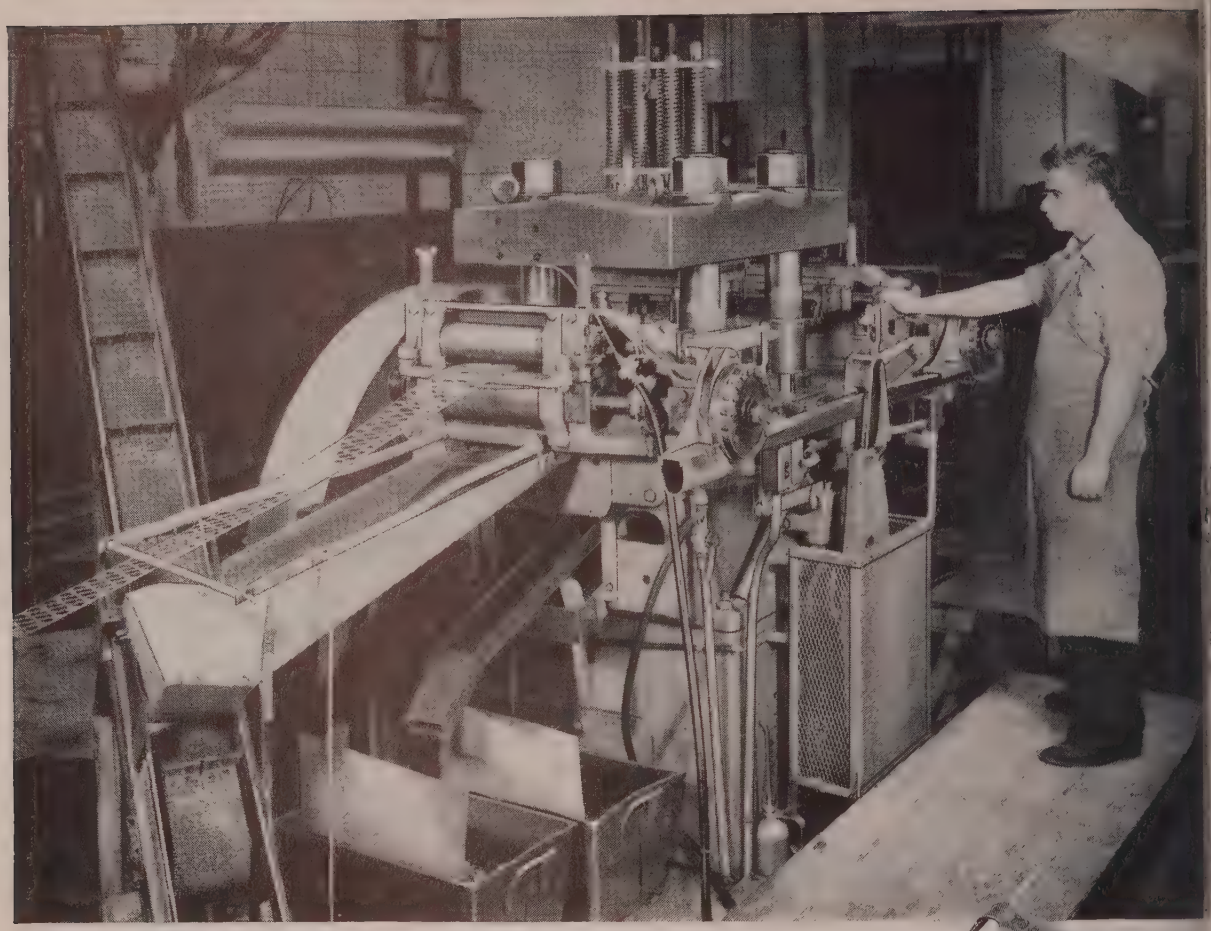
Porcelain Enamel Coating —Thinner the Better

E. HOGENSON

Executive vice president, Chicago Vitreous Enamel Products Co., Cicero, Ill.: "The porcelain enamel industry in general continues to concentrate a considerable amount of its research and development toward objectives of reduced firing temperature and reduced thickness of coatings.

"There are many advantages accruing from reduced firing temperatures. They include operating cost reductions as well as the production advantage of reduced warpage of the steel itself. Lower firing temperatures make possible the porcelain enameling of more complicated shapes in one piece.

"Reduced thickness makes the porcelain enamel coating far less susceptible to damage. This means that manufacturers of products using porcelain enamel as a finish can produce a better product at lower costs, using less material to do the job."

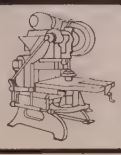


For Fuller Brush Company

Above illustration shows the 150-ton Henry & Wright Dieing Machine used by Fuller Brush Company to produce stampings, ring knobs, mop hinge clasps and other metal parts. Complete-per-stroke Henry & Wright progressive dieing machines set production records wherever they are installed. Yet get more stampings per hour, per square foot of space. Scrap losses are minimized. Henry & Wright machines not only produce at high speeds — their unique design increases die life by as much as 1200%.

Only the best is

PRODUCTS OF OUR ASSOCIATES INCLUDE:



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Division of Hartford-Empire Company
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GLASS MAKING MACHINES

GLASS DIVISION
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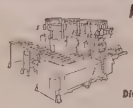

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Joining and Welding

STEPPED-UP armament program finds increased activity in the spot and projection welding of aircraft aluminum and high-alloy steels, accompanied by broader use of low-inertia holders and better cooling.

SIMPLIFIED controls and use of silicone insulation are combining to lighten weight and reduce size of welding machines.

HIGH-FREQUENCY stabilization has been adapted to direct-current welders to facilitate inert-gas welding of thin stainless steel for ordnance.

FLASH butt welding of titanium bar stock with 2-square inch section area into rings for jet engine components is being done by an Ohio company on standard production equipment.

COLD welding of such metals as aluminum and copper by pressure alone, without application of heat, is proving to be one of the most fascinating developments of recent years, the process originating in England.

ADOPTION of a simplified universal specification for arc welding electrodes is recommended as a desirable step toward simplifying their selection and enlarging their use.

DOUBTS over the strength and dependability of copper brazed steel joints have faded and there is ample support for the contention that if brazing is the most economical meth-method then it should be specified.

Copper Brazing Progress Up to Economic Factors

N. M. SALKOVER

Salkover Metal Processing, Cincinnati: "It is now generally accepted that if copper brazing offers the most efficient and economical method for production of a steel assembly, that assembly should be so made. No longer do we hear doubts as to the strength and reliability of copper brazed joints. Technically the process has achieved practically complete acceptance, and its further development will be controlled largely by economic considerations alone.

"Truly bright brazing and bright annealing of stainless steels are subjects of great interest to many manufacturers. Unfortunately, however, except in extremely small sizes, practical furnaces for these operations do not seem to be available.

"In silver brazing, nonferrous alloys coated with the silver brazing alloy are finding many useful applications. The idea is not new, but its general acceptance by industry is a development of the past year.

"The brazing curve is still sharply upward. New applications are found daily, and whenever they are found they save money for the companies using them."

Modern Jet Engine Has Many Types of Welds

I. A. OEHLER

American Welding & Manufacturing Co., Warren, O.: "The modern jet engine is an ideal example of the use of welding processes in the production of high quality precision machines.

"Forgings, castings, sheet, strip, and bars of ferrous and nonferrous materials are joined through the use of various welding processes. It is not unusual to have arc, inert gas shielded arc, spot, seam, projection and flash butt welds in a single engine.

"As far as possible, machine made welds are employed so that the resulting weld quality is independent of the operator's skill. Welding specifications have been established which are aimed at satisfying service requirements rather than arbitrary tests.

"Incorporation of new and better alloys in improved designs, as well as the necessity of substitutions for critical materials requires continuing welding development and establishes the welding engineer as an important member of the production team."

"Hidensity" Process Uses Less Weld Metal

A. F. DAVIS

Vice president, Lincoln Electric Co., Cleveland: "Recent developments in arc welding will expand the welding industry into fields where in the past it has been considered to be at a competitive disadvantage. New processes and techniques are lowering the cost of welding while improving quality.

"One new important welding development is the 'Hidensity' hidden arc process. It employs current densities

on a 5/64-inch diameter electrode which produce a deposition rate comparable to using 10,000 amp on a regular 5/16-inch coated hand electrode. The results are greater welding speeds and greater penetration using less weld metal. Welds are dense, smooth and spatter-free.

"New shielded arc electrodes are being produced which operate with currents 10 to 20 per cent above those normally used. These are easy operating electrodes that deposit dense, ductile welds at high speeds. Smaller, more efficient, high capacity welding machines are being developed to meet this trend to higher welding current."

Resistance Welding Emphasis On Better Operating Economy

G. N. SIEGER

S.M.S. Corp., Detroit: "In the ever-expanding field of resistance welding, the emphasis during the past year has been on improvement of weld consistency with resultant improvement in quality welded products and greater operating economies. The Technical Activities Committee of AWS is to be congratulated for their publication 'Recommended Practices'. Suggested set-up and welding schedules have enabled new users to quickly obtain good results while experienced welders have been able to improve production. Additional information is being solicited from industry and selected data will be included in a revised edition.

"Due to the stepped up armament program increased activity is found in the spot and projection welding of aircraft aluminum and high alloy steels. Here the broadened use of low-inertia holders and better cooling has shown precision welds may be successfully made on what was previously considered borderline welding.

"New machines and accessories have been developed and are in operation economically meeting rigid welding specifications. However, consistent quality welds on even the most modern machines are a function of scheduled competent maintenance."

Semiautomatic Welding Installations Increasing

C. I. MacGUFFIE

Manager of sales, welding divisions, General Electric Co., Schenectady, N. Y.: "During 1950 there were no startling developments in the arc welding field. The year was marked, however, by substantial gains in most phases of the industry through increased knowledge of phenomena and wider application of the many welding processes which hinge around use of the electric arc.

"Of particular note is the vast amount of application data made available to industry from research in the field of inert gas shielded arc welding. A trend was also noted to greater use of this process in field construction, bringing aluminum into tanks, pipelines, etc.

"Production welding during the year saw a decided increase in the number of semiautomatic installations. Automatic wire feeding devices to be guided by the operator were installed in great numbers, both in submerged arc and inert gas shielded welding.

"Electrode improvements consisted mainly in the extension of low hydrogen coatings to the higher tensile steels resulting in better electrodes in the E-7016, E-8016, E-9016 and E-10016 classes."

New Torch Aids Welding In Inaccessible Spots

E. R. BEHNKE

Development engineer, Linde Air Products Co., New York: "A new, lightweight, air-cooled torch for inert gas-shielded arc welding has been developed specially for welding thin-gage materials. No water cooling is required. The torch has a maximum current capacity for continuous duty of 75 amp, using either straight polarity direct current or high-frequency stabilizer alternating current.

"This new air-cooled torch has a two-position welding head. In normal welding operations, the torch head is at a 120-degree downward angle from the handle. Angle of the torch head can easily be changed to a 60-degree backward angle from the handle by interchanging the collet nut and torch cap. Thus, welds can be made in tight spots that were formerly inaccessible."

Recent Welding Research Aids All Industrial Users

JOSEPH W. MEADOWCROFT

Assistant works manager, Budd Co., Philadelphia: "Welding techniques, processes and equipment still rank extremely important as a four-way production tool of industry in guaranteeing speed, quantity, quality and low cost in answering consumers' demand for appearance, light-weight structures, strength and durability. These are major requirements of manufacturers and customers in practically every field of industry, during a construction program, whether applied to civilian needs on a highly competitive market, or during the urgency of a threat of aggression or in actual conflict. In peace, industrial welding has contributed in no small way in building up a political economy that has provided its people with a higher standard of living.

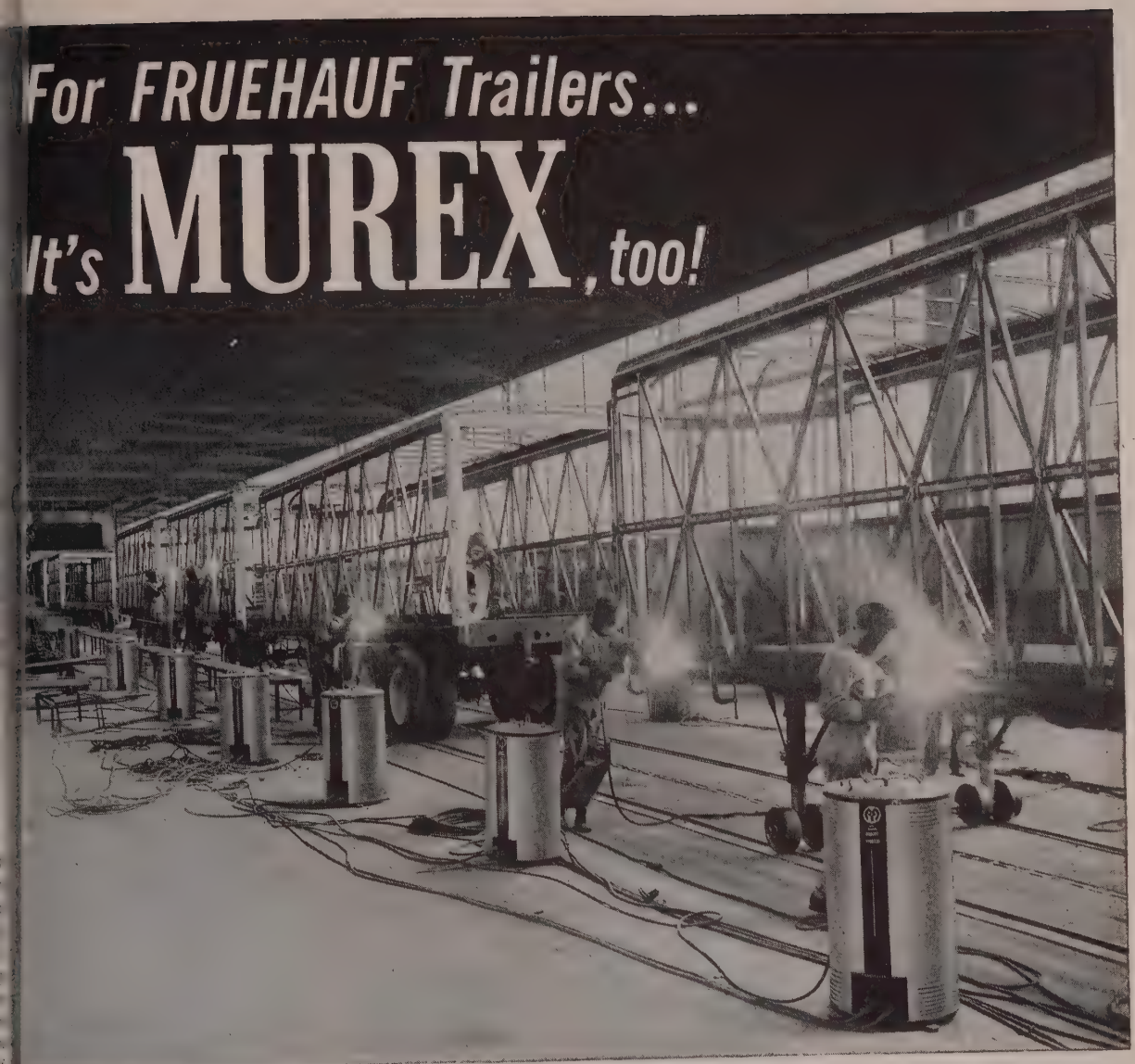
"Welding did not reach this importance in the industrial setup suddenly, but was developed by enthusiasts who applied this then-revolutionary method on a trial and error basis direct to the product to be joined."

Submerged Multiple-Arc Welding Gaining Favor

T. M. JACKSON

Welding engineer, Sun Shipbuilding & Dry Dock Co., Chester, Pa.: "Although arc welding definitely came of age during the last war, it is still an infant when compared to its possibilities toward increased economy and quality in production. Arc welding, both manually and automatically applied, using coated electrodes, also submerged arc, using single or multiple arcs, has expanded tremendously during the past ten years. This is particularly true of the submerged arc process during the past three or four years.

For FRUEHAUF Trailers... It's MUREX, too!



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"The submerged twin-arc process has been mainly used in pipe welding on relatively thin plates. Its application in other fields is sure to follow. Use of either two or three arcs with this process on heavier materials shows considerable promise. The application can be made using either alternating or direct current or a combination of the two. Rapid development along this line is expected."

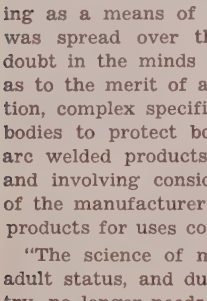
Need for Major Change In Welding Specs Seen

PIERRE CHAMPION

President, Champion Rivet Co., Cleveland: "Many improvements have been effected in the arc welding process during the past year, but we feel that a major change in the specifications for welding will, in the long run, contribute much to the greater use of welding in industry.

"Since the inception of the use of metallic arc welding as a means of joining metals, an aura of mystery was spread over the process with the accompanying doubt in the minds of a vast number of potential users as to the merit of arc welding. To overcome this situation, complex specifications were set up by various code bodies to protect both the fabricator and consumer of arc welded products. These are numerous, overlapping and involving considerable time and labor on the part of the manufacturer of arc welding electrodes to qualify products for uses covered by these governing agencies.

"The science of metallic arc welding has reached an adult status, and due to its wide-spread usage in industry, no longer needs the diaper control imposed by these code writing agencies. A step of major importance has been taken by the manufacturers to simplify selection and enhance the use of arc welding electrodes by recommending the adoption of a simplified universal specification. This new specification fully covers the testing of the electrode as well as the quality and strength of the weld deposits."



General Improvements Widen Applications of Welding

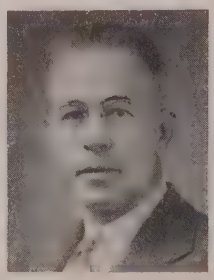
CHARLES H. JENNINGS

Manager, arc welding-engineering dept., Westinghouse Electric Corp., Buffalo: "Significant developments in the field of arc welding have been directed toward equipment, electrodes and process.

"Improvements in welding machines have been directed toward simplified control and the use of silicone insulation to make possible small light-weight equipment. High frequency stabilization has been adapted to direct current welders to facilitate inert gas welding of thin stainless steel for ordnance work. Equipment of this type is also finding a new field in the inert gas spot welding process.

"Electrode development has been directed toward improved welding characteristics. The low hydrogen-type electrode is assuming an increasingly important place for high-alloy steel welding. Higher strength electrodes are being developed for alternating and direct current.

"Automatic welding development continues to progress rapidly. Twin-arc welding and horizontal welding in the 3 o'clock position are gaining in popularity. Hard surfacing deposits by the submerged-arc process have opened up new fields making possible a fast economical process for applying a hard surface on new or worn parts.



Titanium Welding Still In Development Stage

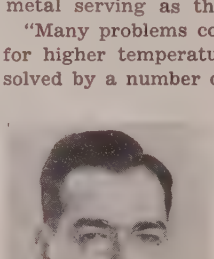
H. W. PIERCE

President, American Welding Society, New York: "For the most part technical developments in welding have not been startling during the past year. While there have been some new developments they are too new as yet to have been fully evaluated by industry for general use. More important has been the expanded use of existing welding processes and methods for new applications.

"In the category of new developments, welding titanium is probably of greatest interest. This is still in the development stage, as is the general use of this metal. Another new development, which has had limited industrial use so far, is the joining of metals such as aluminum and copper by pressure alone without the application of heat. This process was first developed in England and recently introduced in this country.

"Notable among the developments using existing processes is the expanded use of inert-gas shielded metal arc welding to copper and its alloys as well as aluminum and stainless steels. A consumable method with filler metal serving as the electrode, is gaining in use.

"Many problems concerning welding of pressure piping for higher temperatures and higher pressures are being solved by a number of such installations now in service.



Multiple Electrode Use Seen Expanding Today

NORMAN G. SCHREINER

Manager, Unionmelt Service and Development, Linde Air Products Co., New York: "Use of multiple electrodes with Unionmelt welding compositions for both joining and cladding applications is expanding. The principal advantage of multiple electrode lies in the ability to increase greatly the applied electrical energy but so to distribute it in the weld zone that excellent control of penetration and surface contour at high welding speeds can be obtained.

"A more recent development is the use of 'multiple electrodes in series' principally for depositing corrosion or wear-resisting weld metal on a dissimilar base metal with a minimum amount of penetration into the base metal and at relatively high deposition rates. In this technique, the base metal is not a part of the welding circuit but the welding current flows into one electrode through the welding zone and out the other. Fusion into the base metal consistently produces less than 10 per cent dilution, and with some metal deposit (e.g., chromium per on steel) values as low as 1.5 per cent have been obtained. Alternating welding current is preferred for the deposit of ferrous and stainless alloys, while direct current is necessary for the deposition of copper alloys."

Materials Handling

POWER fork trucks of smaller capacities, size, weight and cost have opened up advantages of this type of equipment for average and smaller size shops.

CRANES powered by alternating current, without a mechanical load brake and providing speed regulation equal to, or better than, direct-current designs are regarded a distinct step ahead.

MATERIALS handling operations are receiving as much management and engineering attention in many plants as are more familiar operations like tooling, equipment specification and choice of manufacturing method.

IMPROVEMENTS in work station layout, transfer equipment and automatic loading, coupled with rapid advances in electronics and instrumentation, are bringing closer the day of the "automatic factory".

IMPROVED pushers, load clamps, chisel forks and "take it or leave it" pallets, along with new ideas for holding loads together, have allowed mechanized loading and unloading of cars and trucks where pallet shipments have been prohibitively expensive.

CONVEYOR and allied equipment manufacturers have abandoned the position that there is any end to mechanization of manufacturing, whether metalworking or cheese processing.

ELIMINATION of manual handling by development of a special palletized load of 500 brick is bringing obvious savings.

RAM trucks of 80,000-pound capacity, with split rams for handling one large coil or several small coils of steel, will pare mill handling and threading time.

Handling Speeded by Interlocking Crane Features

J. P. LAWRENCE

President, American MonoRail Co., Cleveland: "It has generally been recognized in the past that a handling problem involving loads from 5 to 15 tons requiring frequent and fast movement, called for application of a top-running crane specially built for this service. The impossibility of bay-to-bay transfer with such a crane was completely ignored or never seriously considered.

"Times have changed and so has industrial building construction. We progress another step forward so that today there is increasing demand for a traveling crane, since it gives maximum hook service, that meets the same high-speed, constant-service requirement and at the same time permits transfer between interlocking bridges or track systems extending beyond the craneways.

"Fortunately the interlocking features to furnish extended hook service had been developed during the last war, particularly in the large plants producing the heavy bombers. To meet the high-speed and constant-service demands, an entirely new approach was made toward the elimination of friction at all load-bearing points resulting in completely articulated and self-aligning trolleys for both crane trucks and carriers.

"New means of propulsion were also introduced in order to cushion the fast starting and stopping necessary for fast operation."

Urgent Need for Better Materials Handling Seen

LESTER M. SEARS

President, Towmotor Corp., Cleveland: "We said it last year and we'll say it again—efficient materials handling has become tremendously important in the nation's economy. The fork lift truck has really come into its own.

"Today, as the country enters another era of war economy and preparedness, the need for fast, economical, better materials handling becomes just as urgent as it was during World War II. During those years the fork lift truck proved its worth. Now even greater demands will be made upon it, and the fork lift truck will meet those demands through the use of many new and improved special accessories.

"Hundreds of new plants are being opened. Production of countless items so necessary to preparedness and defense is being stepped up. Some authorities believe that the decade between 1950-1960 may involve a continuous state of high preparedness—of semimobilization.

"In 1944 the War Department paid fitting tribute to the fork lift truck, referring to it as a 'weapon of war . . . a muscular little giant that moves mountains of supplies.'

"The existing potential of new business in materials handling equipment is greater than ever before—and will continue to be that way for years to come. And this speed-up program in manufacturing is not limited to defense needs alone; during World War I and II all manufacturing increased. The same conditions exist in

this new decade of defense spending. There will be more advertising than ever, more new products launched, more consumer manufacturing.

"And so metalworking engineers will be faced with new materials handling problems. Our engineering department will continue to help supply industry with new and advanced developments and special accessories to solve specific handling problems."

1950—Era of Engineering Goods Manipulators

C. B. COOK

Sales promotion dept., Elwell-Parker Electric Co., Cleveland: "Materials handling is in increasing demand—power trucks are in for more than their normal share of market interest. The first reason for this, of course, is their flexibility to move, store and manipulate products inside or outside buildings. Second, their sales price has not increased with that of other equipment. Power trucks today will show the highest return on investment ever. Power trucks have doubled in price since 1926; the labor that manually handled materials has tripled.

"During World War II hand-operated 'walkie-talkie' trucks were fitted with batteries for shifting loads. Since then and particularly during the past year, many attachments have been added and operators now may ride. Capacities have been increased. In the meantime, principal builders of 'rider-type' trucks have developed lesser rated trucks. Today there is great conflict between the two types. World War II developed the pallet system to the highest degree, but 1950 has developed many devices or attachments to help avoid shipping on pallets, due to the refusal of the railroads to establish reasonable rates on dunnage.

"1950 may be considered as an era of engineering goods manipulators and during which manufacturers lengthened the lines to both lesser and to greater capacity trucks. Management is practically convinced it cannot afford the high cost of manual material handling —it's a waste for which his customer will not pay. In the meantime, the truck manufacturer is employing more men and paying the highest wage in his history."

Devices Versatilize Industrial Trucks

ELMER F. TWYMAN

Vice president, Philadelphia division, Yale & Towne Mfg Co., Philadelphia: "While 1950 saw few radical developments in material handling equipment and methods, there was a continuing extension of the application of electric and gasoline-powered trucks and specialized handling devices for industrial trucks in general. Despite the urgency of increasing production after the advent of the Korean War, industry carefully examined major capital expenditures for material handling machinery.

"A great deal of emphasis was therefore placed on using to the full, equipment already purchased and buying equipment and auxiliary attachments that promised versatility in application. This demand led us to deve a series of easily attached devices for their stand trucks, hoists, and scales that enables one unit to perfo several tasks.

"Of particular interest to the steel industry were 80,000-pound ram trucks we made for Bethlehem St They make it possible for the user to handle one la coil or several smaller ones by splitting the ram and se rating it hydraulically. Trucks of this size, by handl larger coils will make it possible for steel-makers to p duce larger coils than ever before, cutting down handl and threading time, which in some cases is as much 50 per cent. Of interest is the fact that these large tru are probably the first to use diesel powered genera for motive power."

Annual Production Hits Billion Dollar Mark

J. W. WUNSCH

President, Silent Hoist & C Co. Inc., Brooklyn, N. Y.: ' materials handling equipment dustry, I am reliably infor has achieved a billion dollar nual production. Excepting sibly the automobile industry, such rapid growth development in the industrial world is unrecorded.

"Industry has two faces—production and distribu The overall efficiency of industry is affected by the ciency of the least—the weakest link. It seems to that we have pretty closely reached the maximum timum of production efficiency. I cannot say as m for distribution. But I am sure that the efficienc both is to a very large degree dependent on mate handling. This is the last frontier in production ciency.

"We, in the materials handling equipment indu recognize our responsibilities for the size and import of our industry. Our growing business provides th centive for continued progress and development. field is promising and challenging."

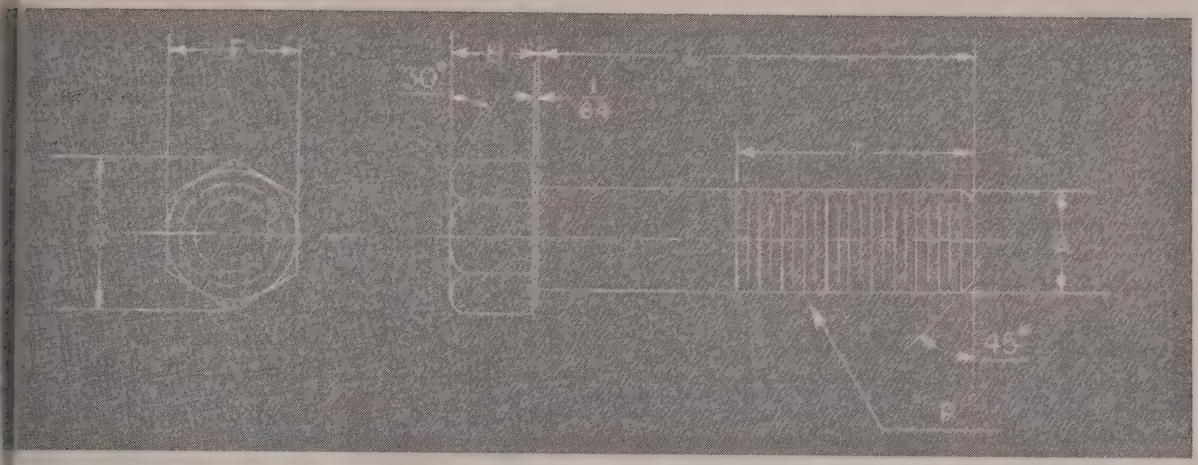
Materials Handling Equipm Helps Combat Inflation

LAWRENCE J. KLINE

General Manager, Autom Transportation Co., Chicago: " alworking industries today an immense burden, produci defend the nation from mi aggression and from growin flation. This is a vast responsibility for private ind and one we in the materials handling industry rec as partly our own.

"As in the past, we will live up to that challenge well recognized that mechanized handling methods enabled industry to lower production costs, increas put, and save time. These objectives are more imp than ever now.

"This is a period when one other advantage of m handling techniques attains special significance. Vi production soaring, manpower becomes a vital asse manpower is in short supply. This is a situation



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For over 20 years our products have been holding things together. They do it well, because our reputation hangs on their performance.

CHANDLER PRODUCTS CORP.

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can only grow worse, for the armed forces and industry are obliged to draw on the same pool. It remains for producers and materials handling men to combine their efforts to develop and use equipment best suited to accomplish the goals of production, and make most effective use of the manpower which is available.

"Our industry has been working for half a century toward solving the problems of wasted manpower, and in times of industrial stress, we face our supreme test."

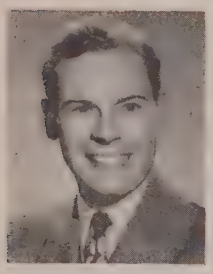
New Plate Design Increases Battery Service Life

M. W. HEINRITZ

Vice president, Gould-National Batteries Inc., Trenton, N. J.: "Recent and prospective developments in the storage battery field, as advanced by us, can be summarized in two short phrases—product research and dissemination of 'know-how.'

"Both of these activities help the user get more and more capacity and life from his power source. This objective, important enough on a cost-cutting basis in normal times, is viewed as crucially important to the coming period of over-capacity production on one hand and short supply on the other.

"Specifically, we have recently developed a new positive plate, known as the 'Z' plate. The positive plate has always been the weakest link in lead-acid batteries and the first part to give way. New plate design and new casting techniques have reduced grid porosity by 35 per cent to add months to battery life. Development of larger high-capacity batteries is keeping pace with the trend toward larger and more powerful industrial trucks—for example the new 80,000-pound ram trucks."



Cost Slashing Unlimited With Mechanized Handling

J. R. MORRILL

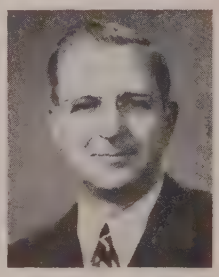
Vice president, Baker Industrial Truck Division, Baker-Raulang Co., Cleveland: "Is there a way to really slash production costs in a booming period like this?

"Many shrewd shop managements have found a 1950 answer in a truly flexible mechanized handling of their production flow with industrial trucks. With shop wages and material costs much higher, and with designs frozen to get maximum production, the usual minor improvements in methods and tooling cannot possibly offset rising costs.

"Our industrial trucks of 1950 are major refinements of a few years ago. Lighter and more maneuverable, they will lift, carry and stack more in a shorter time and they are easier to operate. They are functionally designed for continuous operation and quick simple maintenance. They are a far more efficient instrument for converting kilowatt hours of electricity into foot pounds of material moved thus offering a possibility for drastic slashes in production costs.

"The greatest progress of 1950 has been in pallet elimination for unit loads to be shipped in cars or trucks. Improved pushers, load clamps, chisel forks and 'take it or leave it' pallets combined with new ideas for holding the loads together have allowed mechanized loading ar unloading of cars and trucks where previously pall shipments were prohibitively expensive.

"Opportunities for radical cost slashing by mecha ized handling are unlimited."



Round Steel Strapping Brings Palletizing Economies

H. G. WALTER

President, Gerrard Steel Strappi Co., Chicago: "Materials handli problems in the metals field c be solved in part by new me ods of reinforcement and s palletization, by using galvani round steel strapping.

"Electrical manufacturers now transport 100 wrapped fractional horsepower motors (in 5 tiers of each) on diagonally strapped pallets—a hundredf gain in economy over moving one cartoned motor a time. Cylinder heads, axle shafts, auto truck sprir brake drums and other automotive subassemblies strapped to pallets or are just as often self-palleti Self-palletization means without pallets, an econom method that safely transports machinery parts, w products and zinc, aluminum and lead pigs (50-52 p per pallet), as well.

"Corrugated cartons of welding rods are now c tained with diagonal straps applied by a semiautom strapping bundler that reinforces all sides of the ton, allowing easy stacking and storage. One start new development this year was a special palletized of 500 brick—fire, face or common—and this meant l savings in manual handling for it moved many brick a time instead of one.

"Bundling of steel sheets, tin plate and machinery, sheet steel packages for export, is common and is complished by use of the same method employing vanized round steel straps."

Modern Traveling Cranes Reduce Operator Fatigue

F. M. BLUM

Sales manager, Overhead Tr ing Crane Division, Harnisch Corp., Milwaukee: "Over traveling cranes are still the horses of the material han field. 'Through-the-air' mat handling has further proven its economical meth handling all types of materials in all fields of indu Ability of the overhead traveling crane to provide terrupted materials handling service at a lower m nance cost through scores of years has proven it a very wise investment.

"The crane industry has modernized its equip to take the overhead traveling crane out of the stru steel classification and make it now a machine to material handling. The modern crane with higher s fastor acceleration, and better control, has insured handling of loads at a lower cost. Most crane m facturers today have provided greater comfort t crane operator in order to reduce operator's fatigu

ide him with a cab to give greater visibility for handling of loads.

Increased use of alternating current operated cranes ue to a perfected type of control. Many have been alled in industrial applications where it had been here- re thought only direct current operated cranes would ver the purpose. The alternating current crane with- a mechanical load brake and providing speed regula- equal to that, or better, of direct current cranes has one of the greatest forward steps achieved by the stry. This coupled, together with inexpensive power, brought the alternating current crane into a lead- position in the industrial field. Greater advances in field can be expected in years to come."

Trend to Handling Heavier Unit Loads Seen

F. E. MOORE

Chairman, board of directors, Mathews Conveyor Co., Ellwood City, Pa.: "Probably the most significant trend in the materials handling industry is that which points toward the handling of vier unit loads. The most recent installations for dling coils have involved coils of 50,000 pounds or ter. These are very heavy coils and handling them isfactorily has demanded much heavier conveying ipment than was previously necessary.

'Another significant development is that related to the ss mills. Some of the most intricate and spectacular ipment yet to be applied in the metalworking in- stry has recently gone into brass mills. The han- ng of bars and coils in this very important industry s been a challenge to the best engineering ability in r field.

"Our great foundries have continued to keep pace with velopments in materials handling equipment, and more d more of them have been mechanized. Conveyors d conveyor systems applied in these foundries have, th other modern equipment, gone a long way toward aking them better places in which to work.

"I believe that our industry will be extremely busy ring the months ahead, in spite of the material and anpower shortages which seem bound to occur. We d not fail the last time, and I'm sure we won't this me, whatever the future months might bring."

"Automatic Factory" Age —Just Around the Corner

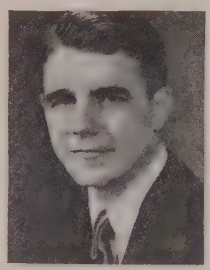
R. W. MALLICK

Executive department, Westinghouse Electric Corp., East Pittsburgh, Pa.: "Of particular significance are three points brought out at a materials handling forum, held in Buffalo recently. These mphasized the attention materials handling operations e receiving from the standpoint of equipment design nd application, industrial and commercial building archi- cture and complete automation.

"There is increasing evidence that materials handling perations are receiving as much management and engi- eering attention in many plants as are the more familiar operations of tooling, process specification and methods. Plant layouts are being designed with streamlined flows as a prime objective. Industrial buildings are receiving functional design treatment as the architects and industrial engineers move closer together.

"A. T. Gaudreau, principal speaker at the forum, stated that complete automation is just around the corner. The continual improvement in work station layout, transfer equipment, automatic loading, etc., coupled with the tremendous strides recently made in electronics and instrumentation, is rapidly bringing us into the age of the 'automatic factory'.

"All of these things are transpiring at a time when this country has an employment of 62 million people, highest in its history, and facing a labor shortage. There apparently is little to fear from progress in materials handling, either through operation-elimination or mechanical improvement. We have more to fear from lack of it."



Manufacturing Mechanization —No End in Sight

JERVIS C. WEBB

Treasurer and general manager, Jervis B. Webb Conveyor Co., Detroit: " 'Synchronizing' 'automatic transfer,' 'electronics' — these terms filled the material handling air during 1950. Manufacturers and users of conveyors and allied equipment have left the position that there is any end to mechanization of manufacturing whether it be metalworking or cheese processing.

"Whole manufacturing processes involving 50 or more conveyors and many automatic processing, fabricating and assembling machines have been synchronously tied together speed for speed. All transfers from conveyor to conveyor, process to process, have been accomplished 'no hands' by automatic mechanical transfer. Overall production speed is controlled from a single point. Flexibility of operation is not lost by due consideration of storage lines where needed.

"All this, as feared for years, has brought problems of education to maintenance and production crews. But, faced by manufacturers and users squarely, the fear has been well met and both maintenance and production are seeing the intricate mechanical and electronic device as a tool of great use, worth understanding and also understandable."

Trend Noted to Smaller Capacity Power Fork Trucks

F. J. SHEPARD JR.

Treasurer, Lewis-Shepard Products Inc., Watertown, Mass.: "Economies of the power fork trucks were originally available, as a rule, only to the larger plants. This was because of their weight and size which in many cases prevented use in the small plant.

"The recent development of this type of equipment in smaller capacities, size, weight and cost, has opened up comparative handling economies for the average and

smaller size shops, which have been quick to take this advantage. Now small plants employing 10 to 15 men, are mechanizing their handling operations.

"Desire for modernization and cost cutting, spurred on by the necessity for more production has necessarily forced consideration of modern handling economies on many concerns which have been slow to adopt them.

"This trend extends to our whole line. Hand equipment is being replaced by power equipment in many cases and hand lift trucks and skids are replacing older handling methods.

"The necessities of the present have brought to industry the fact that materials handling is an important part of manufacturing costs and is a fertile field in which to reduce man hours.

"The result to us has been to transfer the main emphasis of activity from selling to production in order to satisfy as much of this need as possible."

Vertical Rod Storage Brings Operating Economies

A. F. ANJESKEY

Sales manager, Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O.: "The wire industry has recognized the advantages of increasing the unit of production, and in order to make this possible, we have developed a grab capable of picking up to 5000 pounds of steel or copper wire which is wound on reels during the drawing operation. The grab is capable of picking up such reels in either the horizontal or vertical position, and conveying them through other operations such as annealing or storage. This grab can be supplied for handling reels of smaller capacity, particularly in the steel wire industry.

"Considerable interest is also being manifested in vertical storage of steel rod. The experience obtained as the result of the first installation made over a year ago has indicated that the steel wire industry can effect appreciable economy in handling, in addition to saving considerable space in the rod storage warehouse because it is possible to store a greater quantity of wire per square foot of storage area as compared with horizontal storage.

"What is also of utmost importance is the ability to separate sizes, heats and alloys because each column or storage stack is separated from adjacent stacks. In addition, a more accurate inventory can be maintained."

Abrasive Surfaced Plate Boon to Safety Men

E. W. EARHART

Metallurgical engineer, Alan Wood Steel Co., Conshohocken, Pa.: "In all industry, strides toward protecting men and equipment in repetitive operating and control duties have been outstanding over the past forty years. Protective clothing, goggles, safe-toe shoes and other items of personal equipment are today rather generally accepted by the mill and shop men, although it will be an ever-continuing campaign to convince the 'stragglers' that it is their safety to which the effort is directed. Machines are shielded, pits and moving equipment guarded, sound and light signals co-ordina and signs and posters utilized to protect our manpo and engender within them safe working habits.

"Possibly one of the most common hazards remai in the daily working routines is that involved in mo about the operating areas. Tripping hazards may minimized through continued efforts directed tov orderly housekeeping habits and common-sense mai nance procedures. Remaining, however, and weakly tacked, are hazards arising from greasy or oily a common to many metal finishing and fabricating o ations. Common flooring materials offer little protec to men working in locations where water, oil, greas ink generally permeate the air and lay a film on w ways and stairs.

"An outstanding new plate product offers both pos and lasting aid in protecting the most hazardous tro spots. This plate is a rolled carbon steel product, surface of which is completely covered by an abra layer imbedded into the base plate. Development of plate involved a great deal of research work which correlated with the necessary metallurgical and phy testing effort to insure uniform abrasive distribu and desired sharpness of the exposed surface. Metallu cal controls are continued throughout the production to minimize grain crushing and to maintain optir quality standards."

Newly Designed Truss Easily Fabricated

J. K. GANNETT

Vice president and director of gineering and research, Au Co., Cleveland: "Present circ stances have only served to phasize the preference of manufacturers for plants in w maximum flexibility of operations is possible. spans, ranging from 60 to 100 feet, with columns sp from 40 to 60 feet apart, are necessary to obtain optimum condition.

"In designing the trusses, and jack trusses use support the alternate trusses and thus reduce the r ber of columns, it is highly important that proper co eration be given to the several design factors which fect cost, as well as the structure's adaptability.

"Weight of the truss required to carry a specified is by no means the only factor in its design. The a ability of materials and relative economy of the sec used in building up the trusses must be weighed, due consideration for the amount of shop labor req and effectiveness of the steel used.

"Use of H-section members throughout trusses veloped by our research division utilizes material w carries a minimum of extras, is more readily avai than lighter sections, and can be fabricated with a mum of shop labor. Over and above these advantages H-sections used throughout these trusses make it sible to support fixed or moving loads at any point, out regard for location of panel points. This is ticularly important because it enables the plant t stall materials handling equipment wherever require meet operating conditions at a given time. In plants, monorails and hoists have been installed their carriages right on the bottom chord of the tru The H-section bottom flange is used as a crane rail.

Processing Equipment

STUDY of regulator systems on continuous rolling mill and processing lines is facilitated by the use of electrical computing machines in which a simulated disturbance is applied to electric circuits and the corrective action traced by oscillograph.

PORTABLE blowpipe using kerosene, oxygen and water, will pulverize a 1¼-inch hole down through hard siliceous rock to a depth of 5 feet to facilitate quarrying of quartzite deposits.

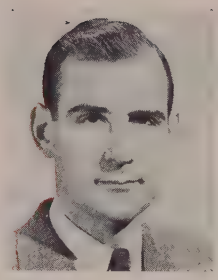
FOUNDRIES continue to push mechanization, concentrating on better charging systems and equipment for suppression of dust, fumes and smoke.

BLAST CLEANING machines, using abrasives such as ground corncobs, walnut shells, apricot pits or rice hulls, are finding applications in both production and maintenance operations.

AUTOMATIC blast cleaning in quantity lots —castings, forgings, stampings, weldments, even bar and sheet—is on the march, with impact-resistant abrasives helping to lower costs.

MOVEMENT of work pieces to and from presses is gradually being shifted from men to mechanical devices of almost limitless variety—air injectors, "iron hands", power-operated pushers and similar auxiliaries.

DUST and fume control systems are demanding more complete enclosures for dust-producing sources, collectors developing higher efficiencies, simpler and more accurate sampling test methods.



Jet-Piercing Utilized For Taconite Removal

D. H. FLEMING

Development engineer, Linde Air Products Co., New York: "Production of large blast holes by jet-piercing has been well proved at a taconite pilot plant on the Mesabi range. Since the large jet-piercing machine went into operation last year, over 15,000 feet of 6½-inch diameter or larger hole has been pierced.

"By contract to the large machine, is the development of a manually-operated jet-piercing blowpipe which is in production operation in a number of quartzite quarries. This blowpipe will pierce holes 1¼-inch in diameter to a maximum depth of 5 feet. It is particularly useful for secondary drilling in hard, highly siliceous rocks and ores which are difficult to drill by jackhammer.

"The blowpipe requires oxygen, a fuel such as kerosene, and water, supplied from a completely self-contained unit which can easily be towed to location of the work. Piercing speeds in quartzite vary from 45 to 60 feet per hour."

Duplex Pipe Line Strainer Eliminates Costly Downtimes

JOHN H. SCHMID

Vice president, American Flexible Coupling Co., Erie, Pa.: "The protection of pumps, valves and control instruments by the installation of adequate straining elements in pipe lines has long been a problem, particularly in larger lines. Cooling water systems and heat exchangers, lube oil and quenching oil transfer systems, hydraulic testing systems, jet condensers and similar installations in the metalworking industry can now be protected against sediment damage and resultant downtime in many of the large installations.

"A gate type duplex pipe line strainer recently developed by the J. A. Zurn Mfg. Co., an affiliate of our organization, available in 8 to 24-inch sizes, requires minimum space, shows very low pressure drop and, most important, the baskets can be cleaned and the unit operated by one man. Since it is a duplex unit, there need be no shutdown for removal of accumulated solids and a single operator in a few minutes a day can clean the strainer elements and operate the strainer transfer valves as required. With this new unit, elimination of downtime caused by sediment, accumulated crystals, scale or other particles commonly found in pipe lines can be prevented as easily in larger systems as was heretofore possible in smaller installations."

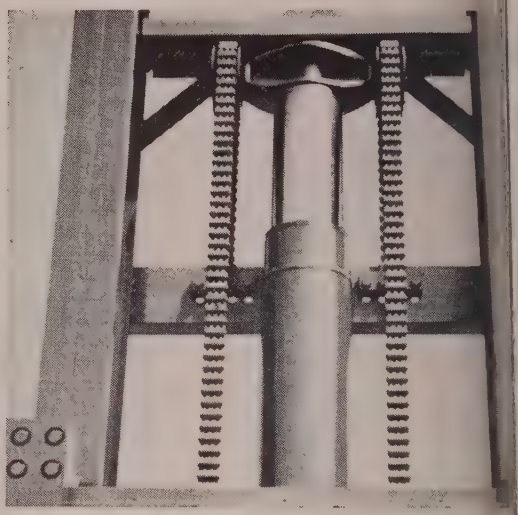
"Building Block" Assemblies in New Control

F. MILLER

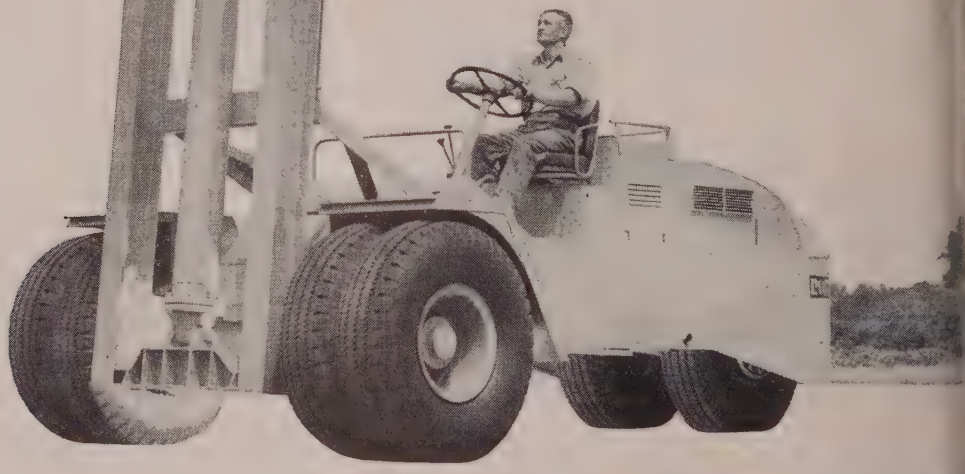
Industrial Control Division, General Electric Co., Schenectady, N. Y.: "We have long recognized the outstanding efforts of the metalworking industries in the realistic approach taken toward their requirements for electrical equipment.

"Many of their processes require adjustable speed drives. In appreciation of the sturdy, rugged, reliable,

Giant fork truck



Morse cable chain like that in truck's lift mechanism is ava able in four pitch sizes, with average ultimate breaking streng ranging from 3,900 to 49,400 pounds.



Tough-built Morse roller chain drives give you on-the-jo stamina and long life. They use teeth, not tension. Mors roller chain drives are positive, can't slip. They are 99% efficient.

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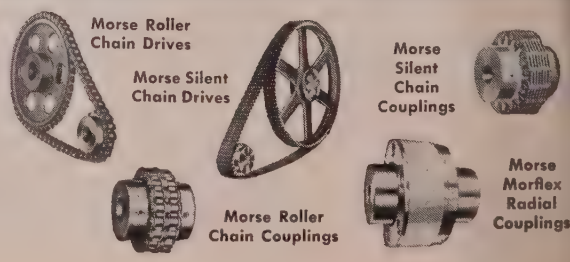
100 Morse Branch Offices and Distributors to supply your power transmission demands.

From coast to coast there are more than 100 offices, representatives and distributors of Morse Power Transmission products to give you quick information and service when you want it—where you want it. *Ask the Morse Man first in any case!* Check your classified phone directory under **"Power Transmission"** or **"Chains"** for the nearest Morse Man.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Morse Silent Chain Couplings
Morse Roller Chain Couplings
Morse Morflex Radial Couplings

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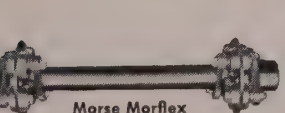
Morse Morflex Drive Shafts

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easy to service requirements of electrical equipment for these industries, we developed a new line of Thymotrol. This line of controls is now fabricated by combining 'building block' assemblies each of which has been carefully designed to perform a specific function within the control. These blocks have unusual accent on ruggedness, reliability, ease of servicing and maintenance.

"Strong acceptance of electronic adjustable speed drives has been further increased by use of this type construction.

"Industry is now able to benefit on a large scale because of increased production, less spoilage, and more efficient operation of their processes by virtue of this strengthened reliability, lower maintenance, and more rugged construction type of control."

Sees Further Foundry Mechanization in 1951

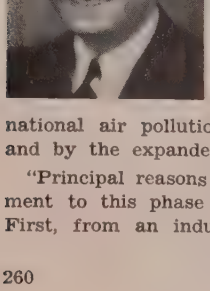
A. J. GRINDLE

Vice president and consulting engineer, Whiting Corp., Harvey, Ill.: "The foundry equipment industry expanded its capacity tremendously during 1950—the large majority of this increase being construction and improvement of large capacity foundries, particularly large captive gray iron units. Equipment sales for 1950 averaged over 200 per cent of 1949 sales and present activity would indicate that 1951 sales will be near the 1950 purchases, probably more in medium size than in the large foundries as was the case in 1950.

"Foundries are mechanizing at a rapid rate and 1951 promises to be a year of further expansion, mechanization, and installation of better metallurgical control equipment by large plants as well as the medium size ones.

"A definite trend is toward installation of better charging methods, hot blast systems to save coke and increase capacity, and dust, fume, and smoke suppression equipment, particularly in larger congested communities.

"Manufacturing costs and selling prices of foundry equipment will continue to grow in 1951 in proportion to the increase of raw material and component parts entering into such equipment; therefore, all foundries planning on expansion should place their orders as early as possible although it will probably be impossible to secure firm prices."



Today's Production Demands 24-Hour Dust Collection

W. O. VEDDER

Manager, dust control dept., Pangborn Corp., Hagerstown, Md.: "Increasing importance of industrial dust and fume control is strikingly illustrated both by the increasing numbers of local, state and national air pollution and industrial hygiene meetings and by the expanded attendance at such meetings.

"Principal reasons for increased attention by management to this phase of plant operations are three-fold. First, from an industrial relations standpoint, modern 'human engineering' thinking requires healthy, pleasant conditions within the workplace. Endeavors to make the place of employment as pleasant as possible pay off in greater production and lower employee turn-over. Both are in demand today.

"The present and probably continuing labor shortage makes it imperative to hold present employees and to attract additional man power.

"Second, ordinances preventing plants from exhausting dust and fumes to the surrounding atmosphere are becoming more numerous and more exacting each year. Dust control systems meet these requirements by collecting objectionable dusts and preventing their distribution to nearby areas.

"The third boost to dust and fume control, in view of present and prospective shortages of material, is the necessity of salvaging material. Dust control equipment provides a simple, low-cost method of collecting many salvagable materials which can be effectively utilized in manufacturing processes.

"Technical advances in dust and fume control systems and equipment center principally around more complete enclosures for dust producing equipment; collectors developing higher efficiencies on finer particle sizes; simpler and more accurate dust sampling test methods.

"Because of management, labor and government interest in the benefits of control, it is becoming increasingly important to obtain more effective control over dust and fume producing operations. Since the exhaust enclosures and hoods largely determine effectiveness of any dust control system, greater emphasis is being placed on enclosure and hood design. The growing tendency is for original equipment manufacturers to design and install integral enclosures and hoods rather than leaving this phase of the machine design to be done possibly haphazardly, or not at all, in the field.

"Stricter control requirements make necessary the trend toward dust and fume collecting equipment which accomplishes higher overall recoveries of micron size particles.

"Use of the synthetic fiber type fabrics shows considerable promise in extending the use of cloth or bag filters to higher temperature and chemical problems. Production up-swing is demanding 'round-the-clock operations necessitating a trend toward continuous operating-type dust collecting equipment.

"Much effort and study is being concentrated on more accurate air pollution and dust sampling test methods in the endeavor to produce more consistent, uniform results and yet better adapted to field use."

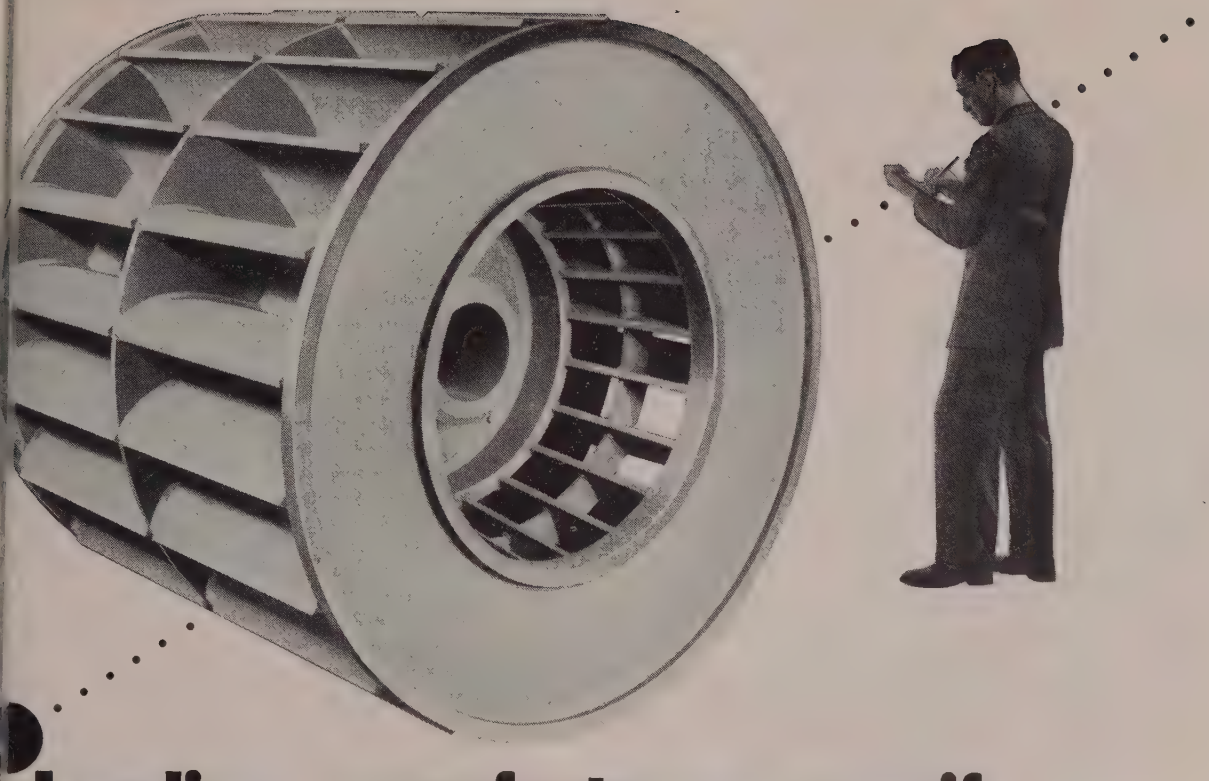
Blast Cleaning To Set New Records

P. J. POTTER

Executive vice president, Pangborn Corp., Hagerstown, Md.: "The year 1950 in the blast cleaning field has been marked by continuing and ingenious development of installations for automatic blasting in quantity production of castings, forgings, stampings, weldments, and even sheet and bar.

"Such installations utilize continuous monorails for larger castings; continuous blast barrels for medium size and small castings; and specially designed machinery for shapes and pieces not adaptable for either barrel or monorail. Continuous flow of material from operation to operation is the goal.

"Although foundry work is very active, more non-



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foundry uses for blast cleaning are cropping up—often in replacement of tumbling or pickling operations. An increased use of automatic controls, and special part-handling mechanisms which increase production by means of higher transport speeds between blasting stations, are two trends helping to keep pace with demands for accelerated output.

"At the opposite pole from high production and big equipment, there seems to be a flurry of interest in small blast cleaning units—for odd-job work, maintenance cleaning, and the use of modern blasting techniques in quarters never before alert to their advantages.

"Impact resistant abrasives are coming into general use because of their longer life, longer life of wearing parts obtained by their use, and lower blast cleaning costs thus made possible.

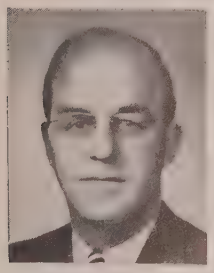
"With use of soft abrasives—ground corn cobs, nut shells and similar materials—maintenance engineers have found a time and labor saving method of blast cleaning motors, generators and heavy machinery, without need of dismantling or moving.

"Wet blasting with very fine natural abrasives, is coming into extensive use for producing extremely fine finished surfaces on dies, molds and tools.

"Salvaging by blast cleaning of steel drums and other metal containers will be greatly increased during 1951 because of the increasing scarcity of steel sheets. Shot peening, to increase fatigue life of parts, will come back into wider use if shortages and allocations of quality steels get tougher.

"Cleaning the tubes of oil stills to remove accumulated coatings of scale and carbon with high pressure water streams (1750 psi) and sand is a new development in wet blast cleaning. The cleaned tubes, inside and outside, give approximately the same distillation efficiency as new tubes.

"During World War II the blast cleaning industry produced enormous numbers of machines for cleaning shells, bombs, guns, tanks and other ordnance items. All of us hate the thought of war, but the blast cleaning industry, if necessity requires, can repeat—and out-produce—any past war record. We pray that war will not be necessary."



Simplified Honing Tool Cuts Precision Work Costs

ROBERT L. GIEBEL

President, Giebel Inc., New York: "In this mass production era, when automatic machines are being developed which are able to pick up a casting off the foundry floor, process it completely, and then deliver it to the finished stock room, all without being touched by human hands, it is enlightening to learn that often, by applying an old principle to an inexpensive new tool, attractive savings can be made.

"A new and unique honing tool recently developed by Sunnen Products Co., St. Louis, has made it possible quickly to finish outside diameters on short length pieces, within tolerances which ordinarily would require complicated, expensive, cylindrical grinding machines.

"This hone is a simple, inexpensive, hand-operated tool which looks somewhat like a C-clamp. It is highly efficient for duplicating very close tolerances. Not only does it save time, but it reduces capital investment ordinarily required, thus permitting engineers more freely to specify close tolerances. Accuracy always reduces assembly costs and increases the life of the product."

"When one realizes how simple and practical this device is, he cannot help but wonder how many other complicated, expensive operations can be simplified in some comparable manner with equally good results."

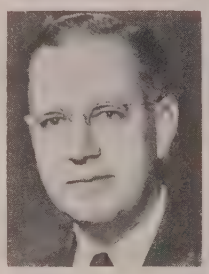
Ball Bearing Capacity Now Rated Uniformly

A. R. SPICACCI

Chief engineer, Bearings Co. of America, Lancaster, Pa.: "The ball bearing industry has finally agreed on a uniform method of rating the capacity of ball bearings. We expect to remove considerable confusion which has arisen in the past on this score.

"Some developments have been made on air hardening thin section bearing rings to reduce the amount of distortion from heat treatment. However, due to the conservation of alloying elements during this critical period of international crisis, it is doubtful that this development will find commercial application at present.

"Dimensional stability of hardened steels for bearing rings has been much discussed among bearing engineers. This subject is important especially at this time because of the storage period. The ABEC (Annular Bearing Engineers' Committee) has defined this stability. The manufacturers are obtaining better dimensional stability in ball bearings than ever before."



Obsolete Press Equipment Invites Low Die Life

JOHN F. HERKENHOFF

President, Minster Machine Co., Minster, O.: "Greater production through greater productivity. This challenge to the press work industry can be met with the use of new, modern presses coordinated with planning of press work operations to efficiently use all facilities, including presses, tools, material, manpower and space.

"Improved methods of handling materials at all stages is a major factor. In many operations, production can be increased by speeding movement of the work piece or material to or between operations. Therefore, effective use must be made of feeds on presses, semi-mechanical feeding devices, mechanical arms, air injection, tote boxes, racks, trucks, cranes, and any other time saving devices.

"Portable equipment may be used to quickly create a production line which will be found to be of great value. Consequently, conveyors, stock tables, and even presses fall into this category.

"Replacement of obsolete equipment which requires frequent and costly maintenance and prevents its productive use during this down time must be given utmost consideration. Obsolete equipment is a very close relative of low die life.

"Stamping plants must have a full realization of the value of a preventive maintenance and safety program. Serious breakdowns or accidents cause a heavy loss in production figures. An effective preventive maintenance or safety program improves the operating morale, increases output, and must be an important function in every efficient stamping plant.

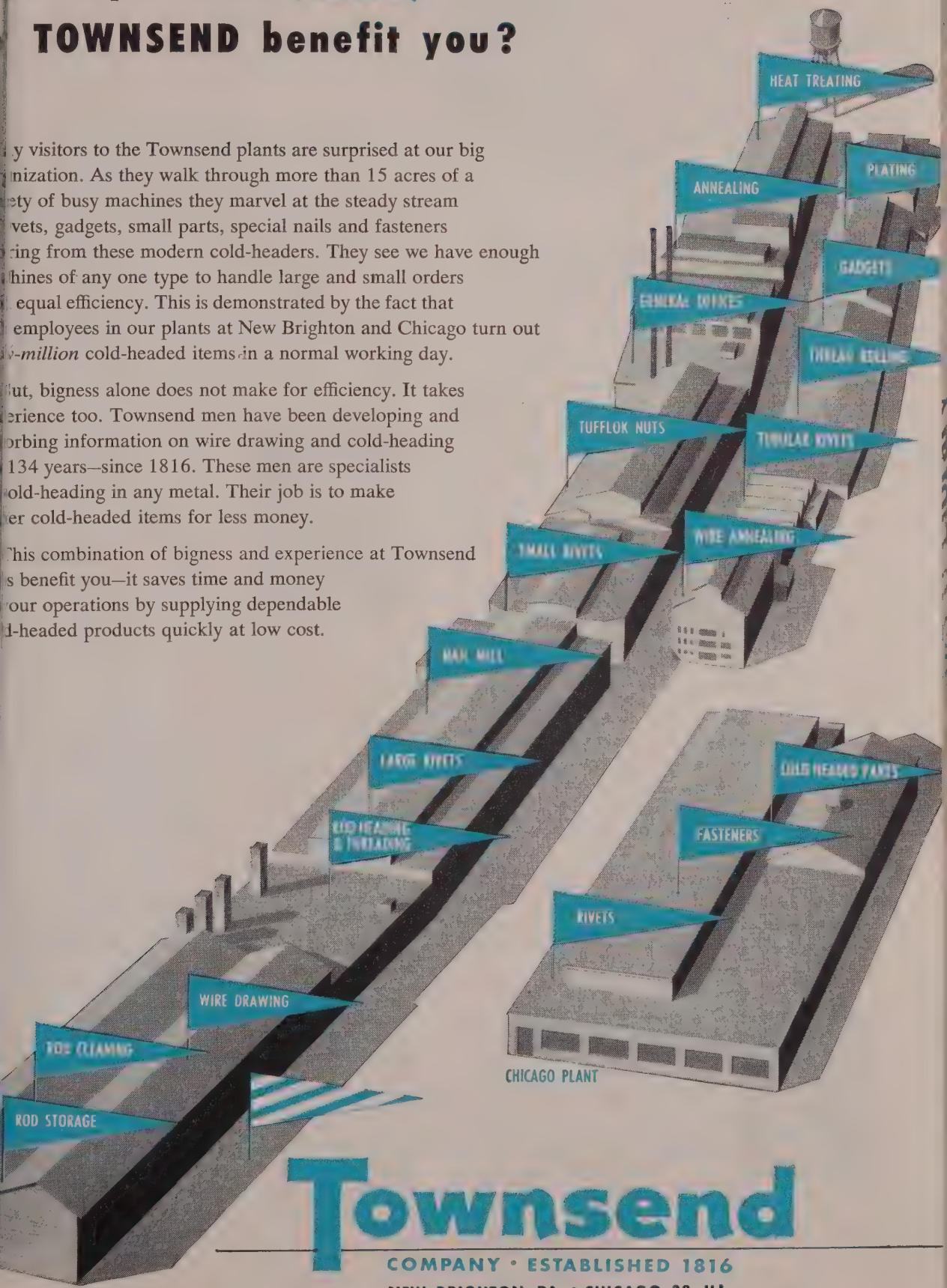
"A comprehensive study from the incoming roll, sheet

w does the size (BIG)
d experience (LONG)
TOWNSEND benefit you?

y visitors to the Townsend plants are surprised at our big nization. As they walk through more than 15 acres of a ety of busy machines they marvel at the steady stream vets, gadgets, small parts, special nails and fasteners ring from these modern cold-headers. They see we have enough hines of any one type to handle large and small orders equal efficiency. This is demonstrated by the fact that employees in our plants at New Brighton and Chicago turn out *-million* cold-headed items in a normal working day.

ut, bigness alone does not make for efficiency. It takes erience too. Townsend men have been developing and orbing information on wire drawing and cold-heading 134 years—since 1816. These men are specialists old-heading in any metal. Their job is to make er cold-headed items for less money.

his combination of bigness and experience at Townsend s benefit you—it saves time and money our operations by supplying dependable d-headed products quickly at low cost.



Townsend

COMPANY • ESTABLISHED 1816

NEW BRIGHTON, PA. • CHICAGO 38, ILL.

or strip stock to the completed product ready for shipment is the only way to meet the ever increasing market for stamped metal parts and products with a resulting lower cost.

"Problems facing the industry as well as its constant growth has brought about the necessity of exchanging many thoughts and processes in order to make the needed progress. There is a necessity of sharing ideas and discussing new problems. In this, the Pressed Metal Institute has become a nucleus for gathering information and a convenient clearing house for technical information of this nature."

New High-Speed Rod Mills To Increase Production

G. G. BEARD

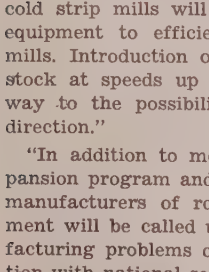
Executive vice president, United Engineering and Foundry Co., Pittsburgh: "The current expansion and improvement program in the steel industry to increase its total annual capacity to nearly 110 million tons by the end of 1952 will have considerable effect on activities of manufacturers of steel mill equipment.

"The projected program includes the installation of additional facilities and modernization of some existing equipment. Accordingly, there will be a demand for new rolling mills and auxiliary equipment, of which mills for producing flat rolled products will represent the larger part.

"New mills will incorporate developments which have been in the design stage prior to inauguration of the program. Of special interest are two new high speed wire rod mills incorporating features to increase overall production by minimizing shutdown time when changing mill schedules and which will produce rods with a high degree of accuracy.

"Increased capacity of revamped and new hot and cold strip mills will call for development of processing equipment to efficiently handle the products of these mills. Introduction of continuous annealing of tin plate stock at speeds up to 1000 feet per minute points the way to the possibility of further developments in this direction."

"In addition to meeting requirements of the steel expansion program and those of the non-ferrous industries, manufacturers of rolling mills and other heavy equipment will be called upon to undertake design and manufacturing problems of considerable magnitude in connection with national security."



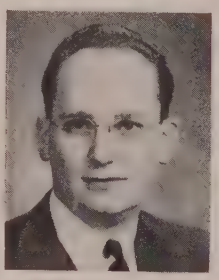
Conditions Today Demand Utmost Production Per Unit

BRYANT BANNISTER

Consulting engineer, National Tube Co., Pittsburgh: "The stress period through which we are now living demands the utmost in production from almost every manufacturing unit. The cost and short supply of materials and equipment discourages construction of new facilities and places emphasis on maximum output from existing lines. Even at the risk of being considered a trespasser on the industrial engineering domain, I wish to point out that in many instances a careful survey of plant operations will disclose bottlenecks which can be often removed or greatly reduced by making minor corrections in equipment, personnel or proper selection of tools and the handling of materials to and from operating units.

"I know of one instance where a minor change in the conveyor system and the provision of a small stocking area between preliminary and finishing operations increased output about one-third. In another case, a change in lubricant permitted an increase of about 25 per cent in production rate. Again, changing a tool from external to internal cooling resulted in speeding-up the operation considerably.

"Changes in supervisory control to increase production are more obscure and are often overlooked but nevertheless are very often effective in attaining the desired results. Management should acknowledge this error in any unfortunate placement of the individuals involved and endeavor to work no hardships in making such changes."



Almost Insolvable Problems —Simple for Anacom

W. R. HARRIS

Manager, metal working section, Industry Engineering Department, Westinghouse Electric Corp., East Pittsburgh, Pa.: "As rolling mill and processing lines speeds have increased and as the trend continues toward continuous operation, need has arisen for a more detailed study of regulator systems and their components. Such analyses can be made through the laborious use of mathematics, but a quicker and far more flexible method is by use of the newer computing machines. Such a unit is the Analog Computer which is installed in our East Pittsburgh Laboratories.

"Primary advantage of the computer is that a system can be set up, its constants varied and performance noted so that in a relatively short time the best and most flexible system can be developed together with the range of constants over which it will be successfully tabulated.

"The solution of such problems by ordinary mathematics would take weeks or years. In fact some systems are so complicated as to be incapable of solution by ordinary mathematical means. The Anacom solves such problems easily by use of the principle of analogy or similitude.

"A physical system is set up on the computer by electric circuits that act like the parts of the physical system being studied. This can be easily done, because mathematics that define the application of basic physical laws to problems in practically every field of science have their counterpart in the mathematics defining the behavior of electrical circuits.

"In the next sequence, after these circuits are set up on the board, a step function voltage is applied to simulate a disturbance, As the system corrects the regulated function its performance can be recorded by oscillographs or photographs of the trace on an oscilloscope. In addition, performance of any component of the system can be studied by connecting the measuring element properly."

Inspection and Testing

RADIATED metals from the Atomic Energy ommission's nuclear reactors will play rominent roles for industrial inspection ork. Cobalt-60, for example, with nine mes the emissivity of radium, makes a look rough 1-inch steel easier.

HECKS of the go and no-go type on inter- al soundness of simple parts are being ade as they move continuously or inter- ittently past x-ray scanning inspection achines.

IRGENT is the need for more information n the effects of controlled atmospheres on nsulating firebrick. A test furnace to simu- ate operating conditions may give some nswers.

QUALITY control of small parts produced at igh speeds is difficult. One way to do it s by means of a regular sampling inspec- ion procedure based upon variables.

FLUOROSCOPY in conjunction with radiogra- phy is a workable means of inspection ap- plied to light alloy castings.

ULTRASONIC inspection devices with auto- matic scanning have been developed, as well as a direct-image sonic inspection in- strument particularly keen to detect flaws in stainless steel spot welds.

"TRAMP" metal detector is minimizing the danger to ore crushing machinery in process- ing taconite ore.

Unique Testing Furnace Evaluates Fire Brick

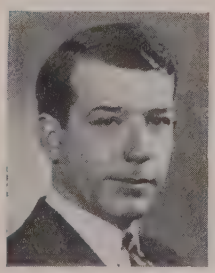
F. W. MULLER

Manager, high-temperature insulation dept., Armstrong Cork Co., Lancaster, Pa.: "One of the urgent needs of the furnace building industry today is for more information on the effects of controlled atmosphere on insulating fire brick. To find the answers our research scientists have designed and built a unique testing furnace. Here they can simulate any commercial atmosphere condition.

"This electrically-heated furnace is designed not only to test single brick specimens but also the performance of miniature wall or arch constructions. Tests also can be made on the effects of insulating fire brick lining on the controlled atmosphere, the amount of heat loss under different atmospheric conditions, and the disintegration, shrinkage and load-bearing ability of the brick.

"Introduction of endothermic, exothermic, dissociated ammonia or other gases is controlled and can be varied for specific tests. Likewise, means are available for controlling and recording almost any desired temperature curve. Continuous measurement of a specimen during the test is made possible by the use of a cathetometer mounted vertically opposite two slight holes in the rear of the furnace.

"The box type furnace is capable of attaining a temperature of 2700° F. Except for loading, unloading and measuring, the operation is completely automatic."



Cobalt-60 Cuts Costs In Industrial Radiography

R. G. TOBEY

X-ray Division, Eastman Kodak Co., Rochester, N. Y.: "Once again the nondestructive testing field is being called upon to assist industry in producing tremendous quantities of parts, assemblies and products of highest quality. Industrial radiography is one of the most important nondestructive testing methods available. During the last five peacetime years, it has continued to grow in importance as a means of increasing product quality and of reducing production costs. During any period of material shortages, with production man-hours and machine hours taxed to the limit, industrial radiography will meet its greatest challenge.

"Although no fundamentally new radiographic devices are in prospect for 1951, improved methods are being developed and will be made available as quickly as accelerated development programs can assure successful industrial use. Improved x-ray fluoroscopy is one such development being worked on by several laboratories. X-ray scanning principles have been very successful in the noncontact continuous thickness gaging of all kinds of moving sheets from rolling mills. The same principles are being applied to automatic 'go no-go' type checks of the internal soundness of simple parts as they move continuously or intermittently past suitable x-ray scanning inspection machines. Commercial devices may be available later this year.

"Further work on the xeroradiographic process is reported, but no promise of commercial availability is indicated for the near future. New developments in x-ray

diffraction and spectrometer equipment have improved and speeded studies made by these methods.

"Artificially radioactive materials are expected to play a larger part in industrial processes. Not the least of the successful applications already made is the use of cobalt-60 as a source of gamma rays for industrial radiography. Many inspection jobs can be accomplished at low cost through the use of cobalt-60, although results are usually obtained more slowly and with lower final quality than would result from the use of proper x-ray equipment."

Sampling by Variables Improves Inspection

J. R. STEEN

Director, quality control, Sylvania Electric Products Inc., New York: "In controlling the quality of small metal parts produced on high-speed automatic machines, it is almost impossible even to consider the thought of 100 per cent inspection or screening in case the product fails to meet specification requirements. Because of the low cost of such parts and speed with which they are produced, it is necessary to get a maximum amount of information from a minimum amount of data and to make provision for having the data evaluated promptly.

"A method of accomplishing the above is by means of a sampling inspection procedure based upon variables. By this we mean a very few items are checked carefully for all dimensions and other measurable quality characteristics in preference to a system of attributes in which the individual items either are passed or are rejected.

"Sampling inspection by variables may be likened to a white line running down the middle of a road. It gives a picture of what the process is producing not only as regards the quantity of defectives, but also the variability between items and the trend toward which the average is moving. This means that adjustments can be made to recenter the process before actual scrap is produced. This is not possible when sampling on a go-no-go basis except perhaps quite by accident.

"To be most effective, these sampling inspections should be made regularly and data recorded systematically. If this is done, results can be readily analyzed and findings fed back not only to assist in control of the production process but also to supply useful information to the engineering department both for improvement of the engineering specification for the part itself as well as for assistance to the designer of the machine on which the part is produced."

X-Ray Diffraction—Versatile Research Tool

NORMAN P. GOSS

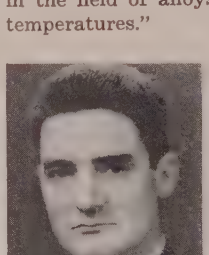
President, Mayfield Research Laboratory, Cleveland: "Application of x-ray metallography to metallurgical problems during 1950 were varied and many, as a review of the abstracted literature indicates. All important contributions may be found in the ASM Metals Review, Vol. 23, 1950, the Institute of Metals, the British Institute of Metals, and Physics Abstracts.

"To give some idea of the scope of applications, a few of the subjects treated, are as follows: Crystal perfection and mosaic structure, divergent beam photography, equilibrium diagrams, structure of light metals, line broadening and its significance, structure of molten metals, retained austenite, relationship between line intensity and crystal defects, small angle scalling, aging of metals, improvements in x-ray technique and apparatus.

"While a number of papers were submitted in 195[illegible] that of W. A. Wood & Raschinger on the 'Crystallite Theory of Strength of Metals' presented new concepts which should encourage and stimulate research in this direction. The concept that there exists a limiting crystallite size for a given metal, is consistent with the findings of the writer.

"Metallurgists are beginning to appreciate the power of the x-ray method in determining retained austenite in quenched and tempered alloy steels. Application of 'soft x-ray' spectroscopy to problems of the solid state, should increase in the next 25 years.

"Application of x-ray diffraction to problems of high and low temperature are also on the increase. The method is ideally suited to such applications, as it is not too difficult to build apparatus which can follow structural changes which go on within the metal alloy held at elevated temperatures, or at temperatures below zero. X-ray methods should therefore find unique application in the field of alloys subjected to high or low operating temperatures."



Magnetic Loop Control Boosts Pickling Tonnage

W. C. HUTCHINS

Manager, Special Products Division, General Electric Co., Schenectady, N. Y.: "Developments in the metalworking industry appear to be at an ever increasing rate—which is a real tribute to the far-sighted vision of people in these industries who pay the price. During the last year or so it has been our privilege to develop the following equipments in cooperation with the metal industries:

"Heavy steel castings for high pressure, high temperature and for various military armament will in many cases require x-ray inspection for flaws. Effectiveness of x-ray penetration is dependent upon the energy level. Some applications require higher energies than the one and two million-volt x-ray. Betatrons with energy levels from several million to several hundred million electron volts (Mev) have been built. While low energy x-rays lack penetrating power, very high energies cause the specimen to emit secondary x-rays and produce radiographs with poor resolution. Energy levels up to approximately 15 Mev, produce the most desirable radiographic results. The G-E industrial betatron has been designed specifically for radiographic work. It has a maximum energy rating of 15 Mev, and has trunnions so that it can be lifted and angulated when applied to production inspection. It should find wide application in the steel-casting industry.

"A pickling line magnetic loop control, introduced this year, makes possible greater tonnage and higher quality pickled steel on continuous pickling lines. At maximum speed, the strip can be held close to the bottom of the tank for maximum pickling efficiency without dragging on the brick and without use of dancer rolls. A mag[illegible]

pickup unit located in the pickling tank bottom an output inversely proportional to the distance een the pickup unit and the strip. This output is to control the motor driven tension rolls and there- aintain a preset strip loop position. By eliminating ng parts like the dancer rolls of previous loop con- , and by using magnetic amplification, maintenance been greatly reduced and the quality of the strip is oved.

o minimize the danger of damage to ore crushing hinery from tramp metal in processing taconite iron a 'tramp metal detector' has been developed and is in operation. The problem involves the detection in magnetic ore of both magnetic iron and non-magnetic ganese steel, such as broken shovel teeth and jack

Since the ore itself is so highly magnetic, neither netic pulleys nor the common types of metal de- ors can be used successfully. Importance of this ipment is becoming more and more significant as the draws nearer when reserves of high-grade ore be- e exhausted."

X-Ray Thickness Gage—Good Quality Control Tool

J. MANUELE

Director of quality control, Westinghouse Electric Corp., Pittsburgh: "The problem of bulk sampling, or the economical inspection, of large quantities of material made by continuous processes s always faced the quality control supervisor. How can guarantee that every inch of a coil of rolled strip el, aluminum or lead, is of the proper thickness? If samples the roll, how shall samples be taken? How- en? Manual inspection using micrometers is too slow d too costly.

"Modern quality control methods, using statistics are considerable help in evaluating inspection results to tablish limits of certainty when estimating quality. But e problem still exists as to how measurements shall taken. Also some quality control supervisors want be sure that all of the product is within specified mits.

"Modern automatic gages and gaging techniques have en developed, using the principle of 100 per cent in- ection, to enable the supervisor of quality control 'to e sure.' Perhaps one of the most spectacular gages ow available to him is the x-ray thickness gage which ccurately compares the thickness of metal strip with a tandard.

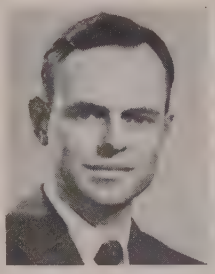
"This is a gage using two x-ray tubes. A standard placed in the x-ray path of one tube, and the strip be gaged is passed through the x-ray path of the ther tube. Resulting reading, on an electric meter, is ne deviation of the specimen from the standard, either lus or minus. This deviation may be read directly in housandths of an inch.

"The gage has several features for lowering costs and nsuring better quality strip. In the first place, strip ay be passed through the gage, which is mounted di- ectly on a rolling mill, at a speed of more than 6000 feet er minute.

"Secondly, built into the gage is a memory circuit hich operates relays to open shear gates at preset tol- rances. In this manner strip can be sorted according to the desired thickness.

"This gage eliminates the very costly, laborious, and rather questionable practice of measuring samples with a micrometer. With it the quality control supervisor can be sure that a shipment of strip material sent to a customer will conform to the specified thickness range.

"The gage may be used on cold rolled steel, copper, and many other metals which absorb x-rays in a measurable degree."



Fluoroscopy—Economical Testing Medium for Castings

J. J. PIERCE

Chief, metallurgical and physical test section, U. S. Naval Ordnance Laboratory, Silver Spring, Md.: "Two trends are apparent in the development and application of nondestructive testing techniques during 1950—one, an emphasis on economy; two, the application of basically new principles. Savings in both time and material have been considered as a necessary part of mass production inspection.

"Fluoroscopy used in conjunction with radiography has been shown to be an economical method of inspection applied to light alloy castings. Automatic scanning has been incorporated into ultrasonic inspection devices and a direct image-type sonic inspection instrument developed which is particularly adept in detecting flaws in stainless steel spot welds. Availability of high specific activity cobalt-60 nine times as active as radium makes the inspection of steel with thicknesses of one-inch or greater more feasible. In the development of radiographic equipment, advances are being made in improved geometry leading to high intensity, small focal area, short time sources of radiation."

Ductile Iron—Today's Most Revolutionary Development

W. B. COLEMAN

W. B. Coleman & Co., Philadelphia: "In our field of inspection and testing we are of necessity in close contact with new developments in the metallurgical field. I have been very much impressed by some recent developments, such as the cold welding process for joining metals at room temperature. This certainly could more economically replace riveting in a number of applications.

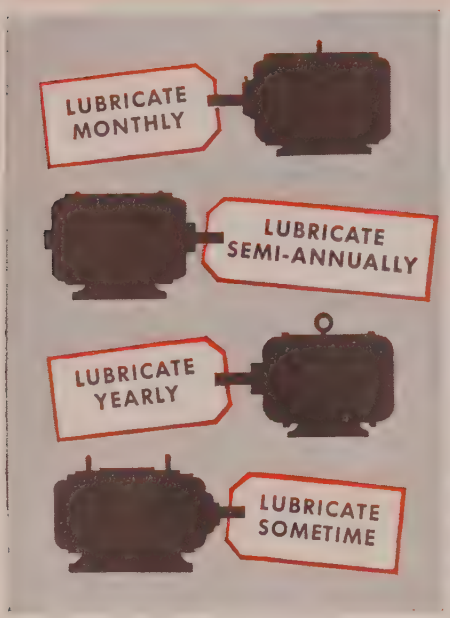
"Advancements in the powdered metals field have been many, particularly with the bonding of metals and ceramics for resistance to heat and thermal shock which combines properties of both materials and produces a better engineering material for high temperature operation.

"I also have been impressed by the phenomenal strides made during 1950 in the further development of titanium and its alloys. This is particularly noticeable in hot and cold working.

"New ductile iron is aptly described as the most revolutionary metallurgical development of our time. In these days of shortages, its new applications are being continually developed."

YOU CAN BE SURE.. IF IT'S

Westinghouse



Why take a chance with "Once-in-a-while" lubrication?

Why fuss with motors that require lubrication "every so often?" Whether it's monthly, yearly, every two or three years, or just an indefinite "sometime," it is as much trouble remembering when to lubricate, as it is to do the lubricating. And it certainly isn't a very good way of making sure bearings get proper greasing attention.

There *is* one way to be *sure*. That's with Life-Line motors. Lubrication is *positive*. Bearings are pre-lubricated and factory-sealed. *No* further lubrication is required!

This is the modern way of lubricating motors. Development of special lubricants, up-to-date manufacturing methods and special seals have made it possible.

Records of nearly half a million motors, operating in every type of industry, indicate that pre-lubricated bearings offer: an average saving of $2.70 yearly per motor . . . 41% fewer motor outages due to faulty lubrication . . . complete freedom from lubrication attention.

Today, periodic lubrication is a costly nuisance. So why take a chance with it when Life-Line offers positive lubrication at no extra cost. See for yourself. Ask your Westinghouse representative for a copy of "Facts on Pre-Lubricated Bearings," B-4378, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21559

If you figure LIFE-COSTS . . . you'll figure LIFE-LINE

Westinghouse *Life-Line* Motors

INDUSTRY'S LEADING MOTOR

ubrication

IL mist system of lubrication—continuous, utomatic and relatively inexpensive—does erything but think, while minimizing the oblems of both over- and under-lubrica-on.

GHT-COLORED, transparent mineral oils re gradually replacing the more common, eavily sulphurized darker fluids in the cut-ng oil field.

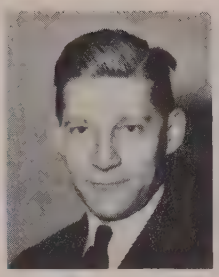
RY SOAP coatings for press-drawing work, pplied to blanks by a hot solution dip, ean a cleaner shop, no sacrifice of draw-ng efficiency.

UBSTITUTE for palm oil is now available, ith qualities of ease in solution mixing, ower cost, lubricity for minimum power re-uirements and leaving no deposit on rolls r metal.

ENTRALIZED lubrication systems have been mproved by timing the lubricant pump to ne speed or strokes of the machine rather han at set timeclock intervals.

HOSPHATE and oxalate coatings, in con-unction with water-base drawing fluids, re successful aids to bench drawing of high lloy steel tubing.

AINTENANCE of machine tool hydraulic ystems has been eased through the use of ew inhibited drawing oils, often good for everal years of service.



"High Speed" Quenching Oils Widen Carbon Steel's Value

W. J. REITZE

Staff engineer, Esso Standard Oil Co., New York: "New refinery techniques, additive developments, and constant research continue to provide metalworking lubricants of more universal application and superior performance at lower cost. For lubricating machine tools there are 'all purpose' greases which will take the place of four or five different types of grease normally required. Tableway lubrication has been a problem due to the increased bearing loads and accuracies required of machine tools and accordingly a special lubricant has been developed which will minimize wear and provide smooth operation of the ways.

"Maintenance of machine tool hydraulic systems has been considerably reduced through use of new long-lasting inhibited hydraulic oils. In many applications it is possible to maintain these units in continuous hydraulic service for several years without replacing oil.

"In the cutting oil field light colored, transparent mineral oils are gradually replacing the more common, heavily sulphurized darker fluids. These oils give equivalent performance on many jobs and enable the operator, due to their transparency, to note work progress at the tool point.

"Development of new additives has made possible new extreme pressure soluble oils and under certain conditions these will perform as well as the usual sulphurized black cutting oils and at considerably less expense.

"In the heat treating field additional steel hardness can be obtained by using 'high speed' quenching oils. This often makes it possible to use carbon steel for a hardened part which formerly required a more expensive alloy steel."

Palm Oil Substitute Now Available to Industry

JOSEPH A. RIGBY

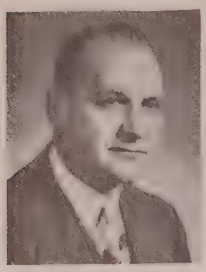
Manager, engineering and sales, Brooks Oil Co., Pittsburgh: "Of the steel industry problems, one of importance has been that of a roll oil for cold rolling of flat steel products. In recent years this has become more critical in requirements because of improved processing with the modern mills, particularly tandem-types together with higher rolling speeds, greater reductions, necessity for economy in power demand, alloy materials, higher degree of finish and more critical and rigid specifications for finished steel products on the part of the customer.

"Palm oil had been found to be the most satisfactory product in performance but gradually developed so many objectionable features that attempts in substitution were found necessary.

"Palm oil is certainly not to be discredited, but has not produced the ideal characteristics in lack of uniformity, action of rancidity, creation of smudge, high price with considerable variance, uncertainty of and expense in mixing solutions and difficulty in purchase and delivery particularly during war time periods from importation.

"A substitute for palm oil is now available having qualities of ease in solution mixing, less in cost, lubricity

for minimum power requirements, no deposit on the rolls, produces desired finish and does not leave a deposit or smudge in annealing. It spreads on metal with water but does not wash off."



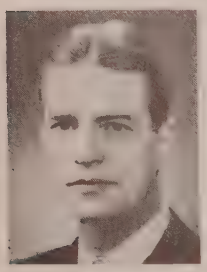
Cutting Fluid Functions Better Understood Today

HARRY A. ERICKSON

Chief engineer, D. A. Stuart Oil Co., Ltd., Chicago: "Three times in a generation defense needs challenge the ingenuity and capacity of the metalworking industry. In spite of a continuing confusion as to the exact mechanics of cutting fluids behavior, much progress has been made toward a better understanding of their functions.

"New metals principally those entering into jet engines and the aircraft program, have introduced difficult problems in machining. Successful production demonstrates better cutting fluids have contributed to a solution.

"Some raw material shortages forced careful study of possible substitutes and with labor costs an important element in production expense, defense requirements demand from management more careful study and continuing attention to the benefits to be derived from good cutting fluids properly applied."



Be Sure Your Lubricants Meet Operating Requirements

E. L. H. BASTIAN

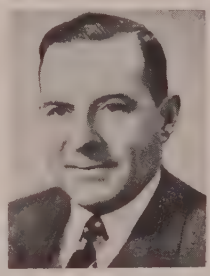
Senior engineer, Shell Oil Co., New York: "The trend toward multipurpose lubricants and metalworking fluids becomes apparent in the steel industry no less than in others. While not always applicable, the practice of consolidating the number of lubricants and coolants used in a plant offers tangible attractions from the standpoint of cost reduction and improved control of lubricants application.

"Principal precaution to be observed is to ensure that products finally selected meet all operating requirements. Industry recognition of the importance of this point is reflected by the growing interest in performance tests as the most suitable basis for lubricant selection.

"In the machining field, water-based metalworking fluids, particularly the so-called 'heavy duty' type soluble oils, are finding broader acceptance. Chemically active emulsions and solutions are rapidly displacing oil-type cutting fluids for many applications heretofore considered beyond the scope of cutting emulsions. Even in grinding, wherein relatively low-concentration emulsions are the rule, the newer types of 'heavy duty' soluble grinding oils show proven advantages with respect to finishes obtained.

"For press-drawing work, dry soap coatings, preapplied to blanks by a hot solution dip, are increasingly utilized. With proper application facilities, the dry soap coatings indicate improvements in drawing efficiency, cleanliness in the shop, elimination of personnel hazards from slippery floors around the presses, and economy due to less wasteful application. The application procedure is also readily incorporated into mechanical handling systems on the press line. The direct cost and production advantages of automation in the metalworking plant are now quite generally recognized by industry engineers.

"For bench drawing of high alloy steel tubing, surface pretreatment methods utilizing phosphate and oxalate coatings, in conjunction with water based drawing fluids are now successfully used instead of older type coatings. A related lubricant development plays an important part in the cold press extrusion of steel."



Oil Mist Lubrication Automatic and Effective

E. RALPH HARRIS

Manager industrial sales, Alemite Division, Stewart-Warner Corp., Chicago: "The longest step forward in industrial lubrication since our introduction of pressure-grease lubrication more than thirty years ago came late in 1950 with announcement of Alemite Oil Mist, the only continuous automatic system ever devised for delivery of oil to bearings. In this simple and relatively inexpensive set-up the questions of lubrication interval, human factor, lubricant quantity and many others are resolved; and, in addition, longer bearing life, elimination of down-time for lubrication, higher operational speeds of machines, lower operating temperatures are provided.

"Problems of over-lubrication, equally hazardous in high-speed machine operation to those of under-lubrication, are avoided by use of the system. Hazards to product and to personnel, such as product spoilage or slippery floors caused by drippage, are also obviated. In short, Oil Mist lubrication brings that ideal situation of a bearing operating with exactly the lubrication film called for by its load, speed, etc., with no possibility of under or over lubrication and with no possibility of an operator forgetting to lubricate. At any time the machine is running it is receiving lubrication."

Close Lubrication Control Eliminates Shutdowns

L. W. DEUTSCH

Sales manager, Trabon Engineering Corp., Cleveland: "Last year produced great progress in the centralized lubrication field. Very close control of volumes of lubricant delivered to bearings of machines is obtained by timing the lubricant pump to the speed or strokes of the machine rather than at set time clock intervals.

"Mechanically operated and hydraulically powered automatic pumps actuated by the machine being lubricated are now available at prices only slightly higher than manual pumps. Very small volumes of lubricant are now easily delivered to the bearings as loads or speed demand.

"Underground mining machinery and the machine tool industry have been the largest users of automatic hydraulic operated systems because of the fluid power available.

"Either oil or grease may be used as lubricant but new and improved greases developed by oil companies have proved ideal as they will stay in bearings and keep machines cleaner."

What Happened in 1950

STEEL's chronology of important industrial events last year

January

Great Business Optimism

. 2—Follansbee Steel Corp. sells Toronto, O., plant and equipment Kovalchick Industries Inc.

. 3 — Radical change in pricing s and nuts effected by Lamson & sions Co., Cleveland, reflects nges in steel prices and bolt manfcturing.

i. 4—Final papers signed transring the steelmaking properties of tsmouth Steel Corp. to Detroit el Corp.

n. 11—Baltimore & Ohio Railroad nounces early construction of a new r at the Port of Baltimore to ndle imported ore. It is to be the st facility of its kind built by any lroad on the eastern seaboard.

n. 12—Inland Steel Co. and Steep ck Iron Mines Ltd. announce an reement in which Inland Steel took option on a large undeveloped reage known as "C" ore body in e vicinity of Steep Rock Lake, Ont.

land Steel Co. gets delivery of e *Wilfred Sykes,* its new ore carr and the largest ship ever built the Great Lakes.

n. 14—Barium Steel Corp. purases the Chester, Pa., blast furnace Allied Iron Works Inc. for $500,-0. Furnace has a daily capacity 600 tons.

n. 16 — Allegheny Ludlum Steel rp. and National Lead Co. form a w company, Titanium Metals Corp. of America, to market titanium metal and its alloys.

Jan. 18 — Robert Denham, general counsel of the National Labor Relations Board, asks Federal District Court for an injunction to stop John L. Lewis from using a three-day work week and unfair tactics in seeking a contract for his coal miners.

Ford Motor Co. buys 200 acres in Cleveland for the erection and production of a foundry and motor plant.

Jan. 19—Blaw-Knox Co. forms a new chemicals and fuels synthesis department that will develop processes and build plants for conversion of fuels into chemicals and oils.

Jan. 23—United States Steel Corp. estimates its pension and insurance program in 1950 will cost $78 million or $67,500,000 more than the present program.

Alan Wood Steel Co. starts production on the first hot strip mill in eastern Pennsylvania, a 30-inch, 6-stand job.

Jan. 25 — Chrysler Corp. workers strike to back up pension demands.

Detroit Steel Corp. awards Pittsburgh Engineering & Machine Co. a contract for construction of a 54-inch continuous hot strip mill to be built for Portsmouth, O.

Jan. 27—Cleveland-Cliffs Iron Co. increases iron ore prices of 50 cents a ton.

Weirton Steel Co. awards Koppers Co. a contract for building a battery of 61 underjet coke ovens.

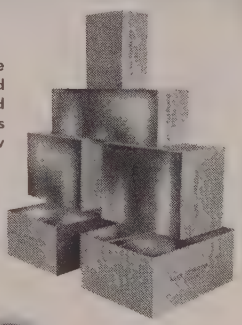
Jan. 29—Bethlehem Steel Co. announces a $30 million expansion program at Sparrows Point, Md., to increase capacity 900,000 tons annually for tin plate, galvanized and hot and cold-rolled sheets.

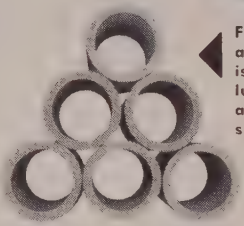
Jan. 31—President Truman proposes a 70-day truce between UMW and soft coal operators while a special Fact Finding Board investigates the coal dispute. Under the proposal the miners would start normal production Feb. 6.

TITUSVILLE forgings

THE NAME THAT HAS IDENTIFIED ADVANCED ENGINEERING AND MASTER CRAFTSMANSHIP FOR MORE THAN 50 YEARS

Quality Die Blocks, and associated Piston Rods and Sow Blocks.





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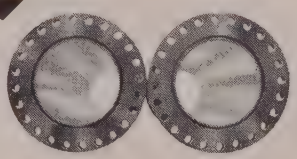
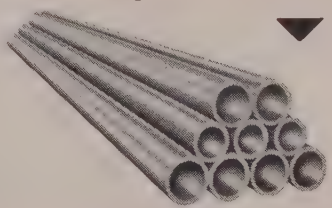
Hydraulic Cylinders—Rough or Finished to precision tolerances.



Seamless Forged and Bored Pressure Tubing.



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GEARS AND SPEED REDUCERS

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February

Feb. 1—Koppers Co. awards a contract to supervise a $50 million engineering and construction program in Turkey under the ECA. Work consists of terminal facilities and coal preparation plants.

Feb. 2—Mine operators accept President Truman's proposal for a 70-day truce in the industry. No decision reached on it by UMW.

Atlas Steels Ltd., Welland, Canada, installing first mills in Canada for production of stainless sheet.

Feb. 3—Armco Steel Corp. announces a new stainless steel alloy possessing high strength and hardness, good corrosion resistance and good fabricating properties.

Coal: A Sick Industry

Feb. 4—Carnegie-Illinois Steel Corp. starts modernization program that will increase production of cold-reduced sheets by 200,000 tons a year in the Chicago district.

Feb. 6—Steel producers start curtailing ingot operations because of coal shortages; low point reached in first week of March.

Feb. 8—Rheem Mfg. Co. buys equipment and inventory of Wheeling Steel Corp.'s range boiler and tank plant at Portsmouth, O.

General Electric Co. is awarded $2 million contract by Detroit Steel Corp. for electrical equipment on the new hot strip mill at Portsmouth, O.

E. W. Bliss Co. awards Westinghouse $400,000 contract for motors and auxiliary equipment for a single-stand strip mill being constructed for Can-

Metallurgici Italiani of Italy.

1—Aloca opens Point Comfort in Texas, first primary aluminum plant built since end of World I.

2—Striking soft coal workers to return to work despite a Court order barring a strike days.

15 — United Engineering & ry Co. plans expansion of its plant at an estimated cost of 00 to $700,000.

16—John L. Lewis asks guaran- 200 days a year, a 7½-hour nd an increase of 15 cents in ies for miners welfare fund.

General Counsel Denham re- CIO-Steelworkers will ask the for union shop elections in ic steel companies.

17—Alcoa begins drawing wire w wire rod and cable facilities ncouver, Wash.

20—Federal Judge Keech signs der directing striking coal min- show cause why they should e found in contempt for fail- o obey a back-to-work order e issued on Feb. 18.

Steel stamping made at new al Motors Corp. plant in the urgh district.

21—Caterpillar Tractor plans to a new plant near Joliet, Ill., se of decentralization, mill pric- system and proximity to sup-

22—Cold Metals Products Co. nces installation of new cold- mill at Youngstown to do jobs ough for standard Steckel cold g mills to handle.

24—Federal Judge Keech directs to face contempt charges.

ral Motors cut prices from $10 0 on its cars and trucks, and ding to its cost of living formu- ut wages 2 cents an hour.

25—Eastern Railroads announce deration of substantial reduc- in freight rates on iron and steel cts to meet truck competition.

27—Bethlehem Steel Corp. an- ces that it increased its ingot city 800,000 tons to 15 million in 1949.

pleads not guilty to govern- charges that the union is defy-

strip fed from coils

FOLLANSBEE COLD ROLLED STRIP is furnished in continuous coils for direct feeding into automatics. This time-saving method of supplying material to stamping and forming machines is a big step toward increased production.

turns an automatic machine

FOLLANSBEE COLD ROLLED STRIP is widely used in plants manufacturing toasters, tractors and television equipment where high-speed automatic machines turn out parts in astronomical numbers. Continuous feeding from coils is essential to maintaining volume.

into a productioneering team

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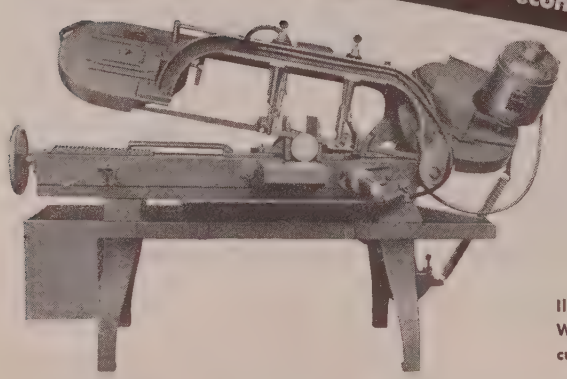
On cut-off jobs . . .

You benefit 4 ways with Wells Saws

1. Fast, continuous cutting action.
2. Greater accuracy on each job.
3. More pieces per length of stock.
4. Greater overall economy.



Illustrated is the popular Wells No. 8 with wet cutting system.

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HORIZONTAL band sawing is the modern, cost-cutting way to handle cut-off jobs . . . and Wells Saws are the leaders among horizontal metal cutting band saw machines. Simplicity of design means fewer moving parts and easy operation. Ruggedly built to increase productivity and reduce cutting costs, a Wells Saw pays for itself quickly and will give you years and years of dependable, satisfactory service.

BIG JOBS or LITTLE Jobs . . . There's a "WELLSAW" to meet your Metal Cutting Requirements. Check the table below and write for complete descriptive information or a job demonstration.

MODEL	49 A	No. 5	No. 8	No. 12
Capacity in inches: Rounds	3½	5	8	12¾
Rectangular	3½ x 6	5 x 10	8 x 16	12 x 16
Blade speeds, ft. per min.	54, 100, 190	60, 90, 130	60, 90, 130	50, 100, 150
Motor Size	1/6 H.P.	⅓ H.P.	½ H.P.	¾ H.P.
Floor Space, in inches	16½ x 38	21 x 50	24 x 72	32 x 78
Wet cutting system	No	Yes	Yes	Yes

Automatic stock projection available for Nos. 8 and 12.

Wells SAWS

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Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
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ing a court injunction against a strike in the soft coal fields.

Feb. 28—ECA approves installation of a semi-continuous 66-inch ho strip mill at Ougree, Belgium, for S. A. Ougree Marihaye. Estimated cos of the entire project is $16.8 million

The House sends back to a Hous Senate conference the freight absorp tion bill which had been up for ap proval.

March

Industrial Decline Accelerates

Mar. 2—Federal Judge Keech acquit UMW of contempt of court charge which had been based on the so coal miners' refusal to return to th pits.

Mar. 5—Coal operators and John L Lewis sign contract settling the co strike. Agreement raises wages 7 cents a day to $14.75 and provid royalties for the welfare fund of 3 cents a ton, an increase of 10 cen a ton.

Mar. 6—Weirton Steel Co. starts new pension plan to provide 33⅓ p cent increase in retirement benefi

Mar. 8—Joint Congressional Comm tee on Economic Report majori holds steel price advances last Dece ber were unwarranted; proposes 3 day public notice of future rises. Se ator Taft states majority wants g ernment price fixing and is seeking smear industry.

All coal production back on a 5-d week as the hard coal workers set with operators.

Mar. 9—Jones & Laughlin Steel Co lets its first contracts for the n open hearth plant on the South Si Pittsburgh.

Mar. 12—Oliver Mining Co. plans

ype agglomeration plant at Vir-
Minn.

14 — Reconstruction Finance
withdraws all fixed price quo-
is for the sale of its tin sup-
From Mar. 14 on prices will
ose prevailing in the open mar-

15—Texas Eastern Transmission
. concludes a contract with Al-
uin Gas Transmission Co. for
ery of up to 250 million cubic
of natural gas a day for resale
tilities in New England.

coal producers increase prices
10 cents to 75 cents a ton.

House approves another version
e basing point bill.

16—Senator Taft in a minority
ment on the report of the House
te Economic Committee con-
es competition in the steel com-
es is reasonably active.

ed States Steel Corp. is putting
into production 1400 beehive
s in Western Pennsylvania, idle
e the miners' union started the
e-day week in July, 1949.

de Minister Howe announces that
ral steel control in Canada will
on March 31.

r. 17—Ford and UAW-CIO sign a
morandum of agreement" on re-
ment, health and security pro-
ms, ending weeks of dispute over
pension fund payments shall be
de by the company.

Mfg. Co. receives order for over
million worth of equipment for
chanization of iron ore mines in
nce.

r. 20—Wheeling Steel Corp. an-
nces a new electrolytic tinning
e is to be installed at Yorkville, O.,
nt at an estimated cost between
and $4 million.

r. 21—Timken Roller Bearing Co.
ns to build two new roller bear-
; manufacturing plants at Bucy-
, O. cost, about $4,250,000.

r. 24—Chrysler Corp. offers to set
a $30 million fund to pay $100
nthly pensions to retired em-
yees; pensions to be entirely fi-
nced by the company.

ar. 27—Kaiser Steel Co. says two
w soaking pits under construction
Fontana will bring total to 16 pits.

To reduce rejects at the point of assembly, use forgings. *Forgings* offer almost a 100 per cent yield of sound parts because forgings are unusually free of concealed defects. This **REFERENCE BOOK** on forgings reveals the full significance of all the engineering, production and economic advantages that forgings offer.

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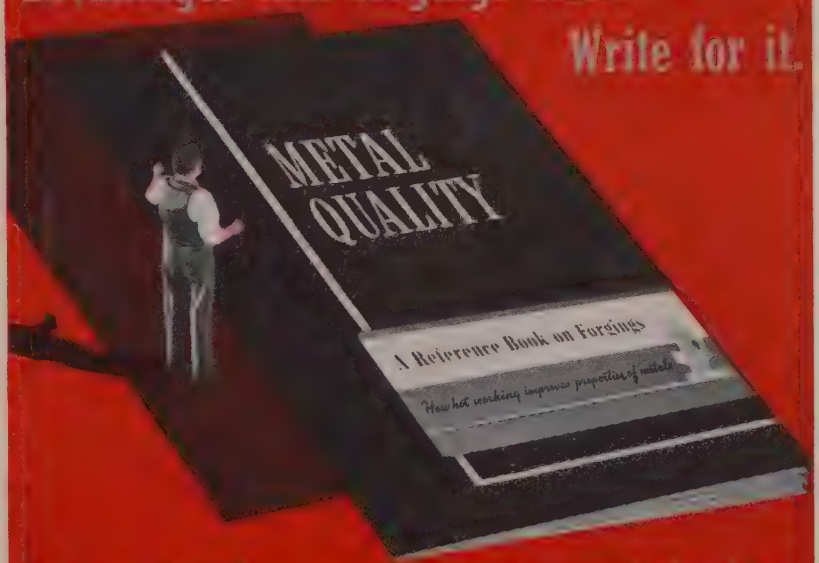

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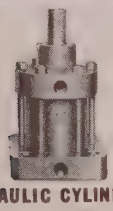
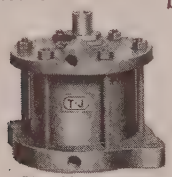

HYDRAULIC CYLINDERS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Work will complete the $35 million expansion program under way.

Mar. 28 — International Tin Studies group studies pact to control world tin exports and prices under United Nations supervision.

United Engineering & Foundry Co., Pittsburgh, pours a 485,000-pound finished machinery casting at its New Castle, Pa., plant. Its size: 27 feet long, 9 feet high and 13 feet wide.

Mar. 30 — Equitable Life Assurance Society announces plan for buying new freight cars and leasing them to railroads.

April

Try at Tightening of Trust Laws

April 1—Austin Co.'s fabricating division plans to increase capacity 50 per cent.

M. E. Solomon Co., Pittsburgh, acquires the steel sheet mill and some other facilities at Apollo, Pa., from M. N. Landay Co. The mill will continue to operate under the management of Whitney-Apollo Steel Corp.

Apr. 4—Tennessee Gas Transmission Co. announces a $100 million construction program for 1950.

Apr. 5—Fort Pitt Malleable Co., last malleable foundry in Pittsburgh district, goes out of business.

Apr. 6—National Tube Co. starts production on its new pipe mill in McKeesport, Pa. Consolidated Western Steel Corp. starts production on 20-inch diameter pipe at its new mill at Orange, Tex.

Apr. 9—Jones & Laughlin Steel Corp. awards contract to build new battery of 59 coke ovens at Aliquippa Works

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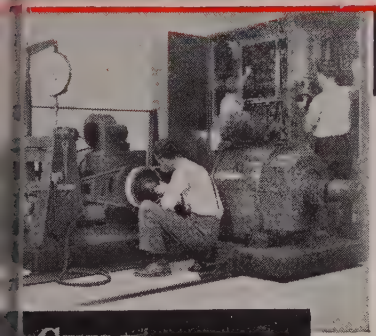
32,000 hours of testing *per week* on V-Belts alone!



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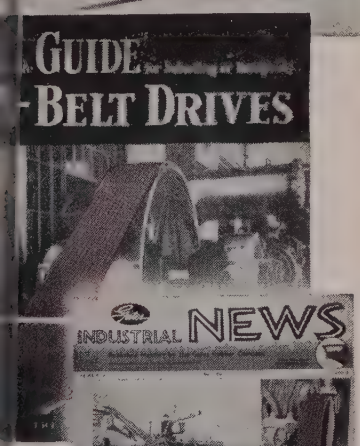
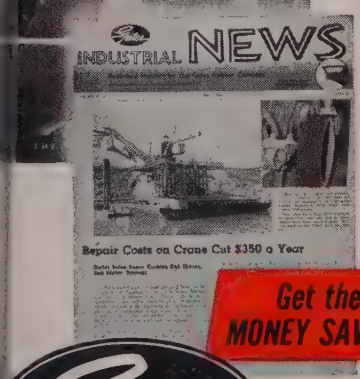
This intensely *Specialized* Research on V-Belts has naturally given Gates Engineers a knowledge of V-Belts and V-Belt drive design that is truly unusual—and it is this specialized knowledge that is embodied in the Gates "GUIDE for SELECTING or DESIGNING V-BELT DRIVES."





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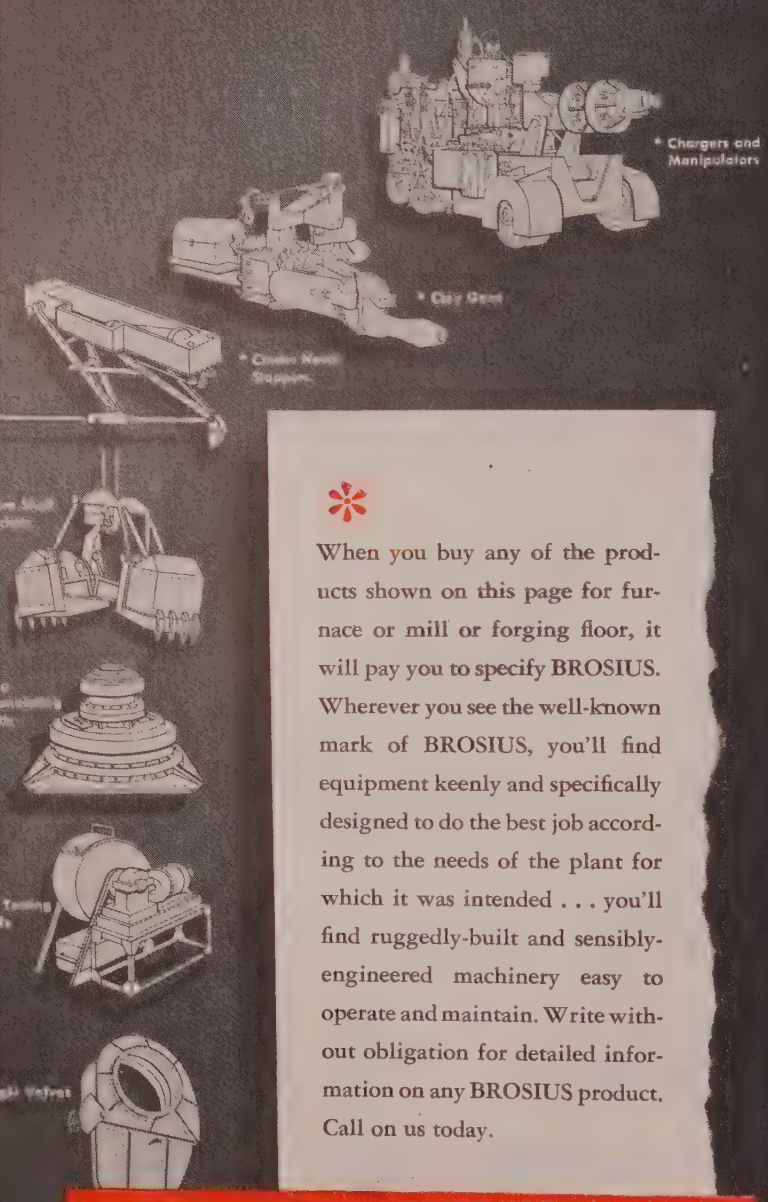

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at an estimated cost of $4 million.

Apr. 14—President Truman vetoes the Kerr Natural Gas Bill, thus leaving the way open for FPC to regulate sales of natural gas in interstate commerce.

Apr. 16—Carnegie-Illinois Steel Corp. announces expansion program in the Chicago district that will increase tin plate capacity at Gary by 120,000 tons. A fourth electrolytic tinning line will be installed operating at 1000 feet per minute, as well as a continuous annealing furnace. The works at South Chicago will increase capacity of the 44-inch slabbing mill that will finish additional slabs for the Gary Works.

Apr. 17—In a report to the Celler Committee Interior Secretary Chapman urges that wider and real competition be fostered in the steel industry through encouragement of investment in new companies. House subcommittee hearings on "bigness" get under way.

Apr. 18—Pacific States Steel Corp. announces first of four 150-ton open-hearth furnaces nears completion as part of a $6 million facilities expansion program.

Apr. 19—Armco Steel Corp. starts a new materials handling technique for feeding open-hearth furnaces with scrap and other materials. Method will cut in half the time required to charge 150 tons of scrap into a furnace.

Charles M. White, the president of Republic Steel Corp., tells the Celler Judiciary Committee that bigness was the thing that made this country great.

Apr. 21—Interstate Commerce Commission authorizes eastern railroads to reduce rates on selected list of steel products shipped in 80,000 pound cars, effective May 1.

Koppers Co. says coke was first produced at the new steel plant near Concepcion, Chile. The blast furnace will be blown in during the first week of May and the whole plant will be in operation some time in June. Cost of plant: Over $70 million.

Apr. 25—Ben Fairless, president U. S. Steel Corp., denies before Celler Committee that U. S. Steel seeks role in cartel.

Apr. 26—Irving S. Olds says United States Steel Corp. will definite

an integrated steel mill at isville, Pa.

27—CIO's new electrical work- get control of the majority of inghouse Electric Corp. work- In bargaining elections held in pany's plants, the IUE was vic- ous over the left-wing UE.

lehem announces plans to build ering plant at Lackawanna, N. Y.

28—Columbia Steel Co. says it install a single stand, 2-high per mill at Pittsburg, Calif., for tening hot-rolled sheets received n Geneva.

May

1—Eastern railroads establish er rates on 80,000-pound minimum loads on restricted list of iron and el products.

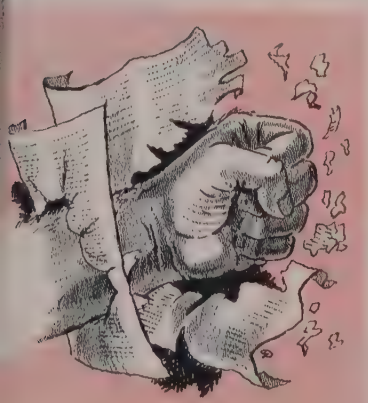
Moreell says Jones & Laughlin el Corp.'s modernization program l cost $273 million by 1952.

3—House Public Lands Committ- approves $330 million subsidy for ancial aid to mining companies in erating existing mines and in ex- ring for new mineral deposits.

erican Brass Co. says it is spend- about $2.5 million to modernize brass strip mill in Buffalo, N. Y., nt.

permit actual experience with minum alloy pipeline, the Federal wer Commission authorizes Ala- ma-Tennessee Natural Gas Co. to nstruct a 9500-foot lateral line to rve the Reynolds Alloy Co. plant Listerhill, Ala.

ay 5—Chrysler signs contract with



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. . . For Thousands of Uses!

Quality control at Seneca allows you to plan production without future worries about material variations. Iron, steel, low carbon, high carbon, tempered or untempered, aluminum and bronze wire are all produced according to the same high standard.

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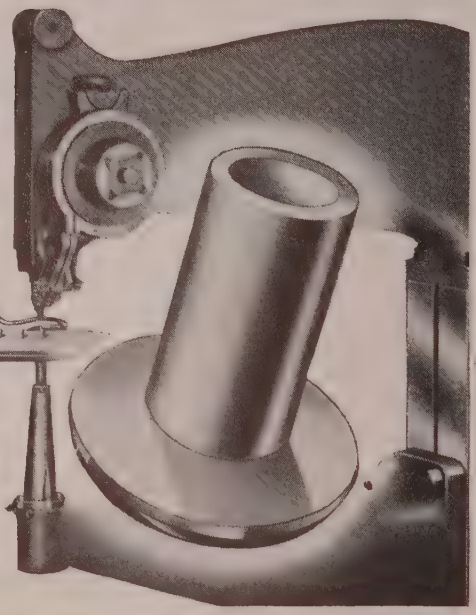

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Tubular rivets that *roll-crimp* without fracturing require a *specialized* wire produced under carefully controlled manufacturing practices.

Keystone's Tubular Rivet Wire is the result of "special processing" at all stages . . . specially selected steel furnace charge, special drawing practices, carefully controlled annealing in process, and rigid inspection.

These special manufacturing techniques developed by Keystone have produced a wire with exceptional forming qualities, either for *extruded* or *drilled* tubular rivets.

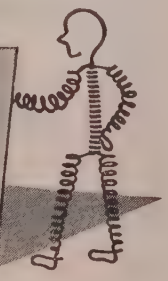
Wire for drilled tubular rivets has the proper hardness for longer drill life; wire for extruded rivets has uniform metal flow qualities required in extrusion headers. Both types have just the right ductility for cold heading and excellent roll crimping.

If your product requires a "specialty" wire of any kind, we can help you.

KEYSTONE STEEL & WIRE CO.

SPECIAL ANALYSIS WIRE. SETTING NEW STANDARDS OF PERFORMANCE

PEORIA ILLINOIS



UAW-CIO, ending strike which began Jan. 25.

May 7—Steel Co. of Canada settles with the CIO giving the union a 40-hour week and a 13-cent wage increase, of which 8 cents is given effective April 1, 1950, and the additional 5 cents becomes effective April 1, 1951.

May 8—ECA reports industrial products produced in Europe are now up to 120 per cent of the prewar average.

May 9—A new ore bridge than can handle well over a million tons of iron ore annually will be built at the Homestead district works of Carnegie-Illinois Steel Corp.

May 10—Revere Copper & Brass, Inc., New York, acquires a plant in Clinton, Ill., for production of Revere Ware copper clad stainless steel cooking utensils.

Four major railroads go on strike as firemen ask for a third man on multiple-unit diesel locomotives. Railroads affected are Pennsylvania, New York Central, Southern, and Santa Fe.

U. S. Steel announces four subsidiaries conclude agreements on elimination of plant salary wage inequities. Salaries start at $83 for bi-weekly period.

Only merchant foundry iron stack in Pittsburgh, operated by Pittsburgh Coke & Chemical Co. at Neville Island, Pa., closed down for complete relining.

ECA approves installation of a new rail and structural steel mill at Alpin, Montan, Austria; overall cost is $6.1 million, of which ECA provides a third.

May 16—Fairbanks, Morse & Co., Chicago, and Canadian Fairbanks-Morse Co. Ltd. enter the Canadian railroad diesel locomotive manufacturing field by buying a substantial stock interest in Canadian Locomotive Co., Kingston, Ont.

Railway firemen end their strike against four major railroads.

May 17—Lake Carriers Association reports ice conditions have hampered navigation of ore carriers in the upper lakes enough so shipments of ore are about 8 million tons behind last year.

Pennsylvania Railroad places orders

ROLLS for ROLLING RAILS

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use
- PHOENIX "A" ALLOY STEEL ROLLS

FINISHING STAND
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- PHOENIX SPECIAL RAIL FINISHING ROLLS

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use
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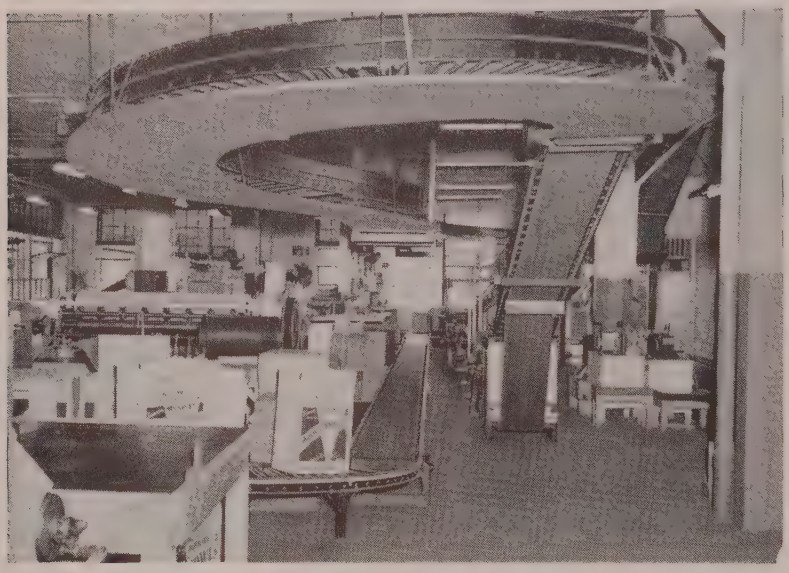
FOUR WAYS To Cut Your Handling Costs



1 WITH ROLLER OR BELT CONVEYORS

— Wherever packages, parts, or units have to be handled — do it faster, better, cheaper, with Standard roller or belt conveyors, power or gravity. Standard also builds slat, chain, wheel, or pushbar conveyors to fit your needs.

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— a small, light, compact, easily portable and maneuverable conveyor unit that stacks, loads, unloads cases, cartons, packages up to 135 lbs. in weight. Can be used inclined, declined or horizontal. Electric motor operated.

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Write for Standard's general Catalog No. ST-11. Tell us what you want to handle or name equipment on which you want more information.

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Standard
GRAVITY & POWER
CONVEYORS

for 10,000 freight cars to be financed under a new insurance company-rental program. It is the largest single order placed with outside car builders in more than 25 years.

May 19—Alcoa advances aluminum pig and ingot one-half cent per pound; other interests follow price action.

Tennessee Coal, Iron & Railroad Co. purchases site for an iron ore terminal at Mobile, Ala., to handle imports from U. S. Steel's Venezuela project.

May 20—Jones & Laughlin Steel Corp. breaks ground on its six furnace open-hearth plant at its Pittsburgh Southside plant, which is estimated to cost $42 million.

May 21—Continental Steel Co. officials authorize purchase of a new continuous rod mill at an estimated cost of $5 million.

Sylvania Electric Products Inc., New York, announces plans to expand radio-tube manufacturing facilities and will build new plant at Shawnee, Okla.

May 22—Spokesman for Bituminous Coal Operators and UMW tells the Senate Labor subcommittee Federal aid is needed for the soft and hard coal industries to counteract the effects of importation of foreign oil.

May 23—United Auto Workers and General Motors agree to a new five-year contract, thus eliminating possibility of a strike. Future wage increases are provided for the next five years.

British government drops its steel allocation plan which has been in effect for the past ten years with the exception of sheet and tin plate.

Alcoa reactivates existing facilities and announces plans to add new facilities at New Kensington, Pa., plant for the production of magnesium sheets to meet military needs.

May 25—Algonquin Gas Transmission Co. completes plans to bring natural gas to New England.

CIO-Electrical union wins majority at General Electric plants.

May 26—Carnegie-Illinois Steel Corp. plans addition of two new coke batteries of 87 ovens each at Clairton.

P works. Contract awarded to Kopp Co.

rge Love, president of Pittsburgh solidation Coal Co., says a permanent program is being set up to otiate future contracts with W. Harry M. Moses, president of H. C. Frick Coke Co., is asked head the new group.

iser Steel Corp. signs new $35 mil- contract for steel pipe for the as to Illinois natural gas line.

y 29—Townsend Co., New Brighton, Pa., completes program that bled capacity and increased va- ty of cold-headed products made its Chicago plant.

y 30—Republic Steel Corp. plans ship about 137,000 tons more of d-rolled sheet annually early in 51 and increases ingot capacity in eveland by about 11 per cent.

ay 31—Nickel prices advanced 8 nts a pound by International Nickel . to 48 cents.

eneral Electric Co. will spend $50 illion to improve and increase its oduction facilities.

June

une 1—CIO's new electrical workers nion, the IUE, won a narrow victory ver the left-wing UE for represenation at 57 General Electric Co. lants.

une 2—Federal Judge Knox refuses etition of the Justice Department to reak up the Aluminum Co. of Amerca in an anti-trust case started hirteen years ago.

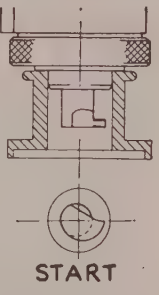
une 3—Basing point bill passes the enate and is sent to the White ouse for signature.

eneral Electric plans to start a $1 illion improvement program at aunton, Mass., Plastics Division lant.

une 6—Bethlehem Steel Co. anounces a $32 million expansion proram for its Johnstown, Pa., plant.

une 7—George Love, president, ittsburgh Consolidation Coal Co., deies coal industry is sick. States hile industry is willing to meet ompetition of domestic fuel, it is aging an intense fight against forign oil flooding some of our natural oal markets at "dump" prices.

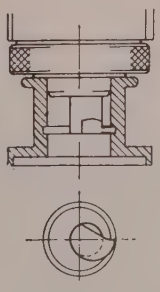
One RECESSING TOOL...
Any RECESSING JOB!



● Cut Recessing Costs on your Drill Press . . . Boring Mill . . . Turret Lathe . . . Radial Drill . . . etc. The **ALL NEW** Series "R" Maxwell Recessing Tools provide unlimited versatility.

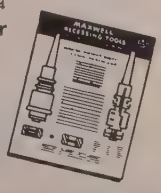
SIX sizes are stocked for immediate shipment. Shanks to fit your machines are instantly interchangeable. Capable of taking cuts at extremely high rates of feed, the new Maxwell tools feature a micro-adjusting collar which facilitates rapid and accurate recess diameter control to within 0.001-inch or 0.050-inch per tool revolution. Cutters can be supplied to make single or multiple recessing in a single operation.

Cut location can be made from either top or bottom surfaces. The ball-bearing pilot facilitates use of Series "R" Recessing Tools with existing fixtures. If fixtures are not used, ball-bearing pilot will stop on the workpiece surface to accurately locate the cutter.



Hardened tool-steel wearing surfaces guarantee maximum tool life. Cutting action is smooth and requires only finger-tip feed pressure. Series "R" Recessing tools are regularly furnished having cutter ratio of either 1:3 or 1:1. Hole in tool block permits flow of coolant or lubricant to cutter.

Standard Series "R" Recessing Tools are available to cut recesses from ¼ to 4¼ inches in diameter. Write today for catalog "R" . . . .



Precision boring with MASTUR heads is described in catalog PBH. These inexpensive tools feature large capacity, adjustability and accuracy. Specifications are charted.

Production Boring with the E-Z set line of Boring heads is subject of catalog No. 30. Complete line of tools is shown. Prices, capacities and specifications are charted for reference.

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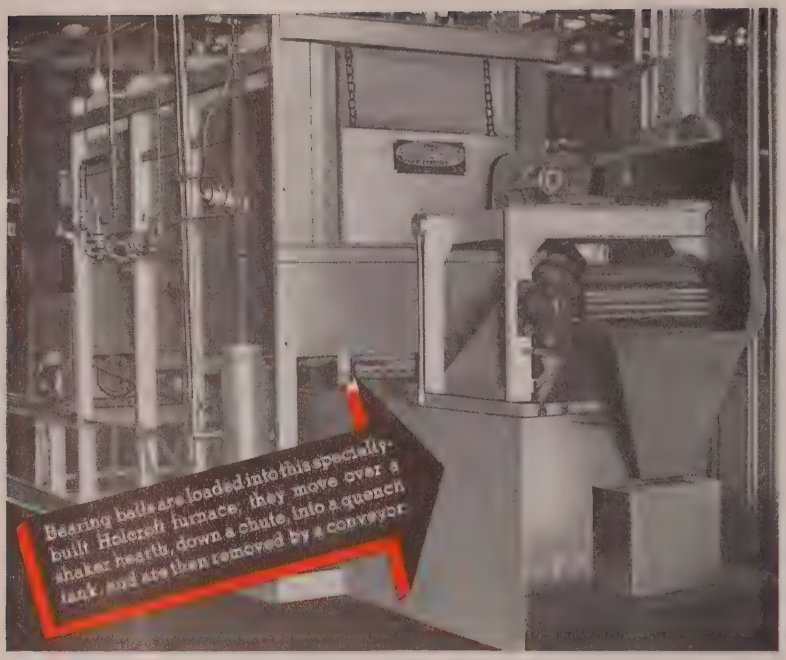
Bearing balls are loaded into this specially-built Holcroft furnace, they move over a shaker hearth, down a chute into a quench tank, and are then removed by a conveyor

this custom-built Holcroft furnace

HARDENS BEARING BALLS TO EXACT SPECIFICATIONS

This continuous shaker-hearth furnace is typical of the many kinds of heat-treat furnaces built by Holcroft.

Designed to meet exact hardness specifications, this furnace heat treats 150 pounds of bearing balls per hour. The operating cycle totals less than 30 minutes.

The adjustable shaker hearth maintains even heating of the work and uniform load distribution. Low-cost heat is provided by Holcroft removable electric heating elements with three-zone automatic control. If desired, Holcroft gas-fired radiant tube burners can be used. Because the furnace is above floor level and has no permanent connections, it can be moved quickly and easily to any part of the production line.

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CANADA — Walker Metal Products, Ltd., Windsor, Ontario
EUROPE — S.O.F.I.M., Paris 8, France

Korean War Starts

June 8—Charles E. Wilson says General Motors Corp. will not raise automobile prices as a result of the new CIO contract.

The Yoder Co. announces formation of a subsidiary in France to operate a new plant in Paris.

June 13—Kaiser Aluminum & Chemical Corp. announces $1 million will be spent to improve its aluminum cold rolling mill at Spokane, Wash.

June 14—Rheem Mfg. Co. plans to spend $4,250,000 to expand its plants and develop new products.

June 15—American Iron & Steel Institute discontinues publication of railroad freight tariff book on iron and steel.

June 16—President Truman vetoes freight absorption bill. Says it's OK to absorb freight and there's nothing wrong with quoting delivered prices, just make sure there's no collusion or concerted action.

Allis Chalmers Mfg. Co. and CIO announce settlement on terms of a pension agreement.

June 19—Bethlehem Pacific Coast Steel Corp., Los Angeles, completes installation of a new 75-ton electric steelmaking furnace.

June 20—Ferro Enamel Corp., Cleveland, starts $1 million expansion.

National Steel Corp. announces plans for $25 to $30 million program to lift ingot capacity by 500,000 tons per year by expanding blast furnace, coke and open-hearth facilities.

"Save with SIMONDS" Forged

Rotary Shear Knives

› says anyone who slits any type of eet or strip metal. For they *know* at these "Red Streak" Knives cut raighter, cleaner, *and longer between arpenings* . . . because they're forged id micro-finish ground. Forging conenses the grain structure — prevents cking. Micro-finish grinding perits non-ferrous metal slitting without ick-up."

esigned for specific shearing applitions, these long-lived knives are ade from 3 types of steel forged in monds' own mills . . . High Chrome, pecial Alloy and High Speed. Send for free "Shear Selector" chart or ask for a "Simonds Man" to help with your slitting problems.

. . . and Squaring Shears

Cross-section showing "Tungsweld" High Speed Steel inlaid cutting edge.

This "Tungsweld" Squaring Shear far outlasts other types . . . causes less down-time . . . gives far faster, cleaner shearing of tin plate, silicon, monel, stainless and other thin sheet metals . . . all because of Simonds' special method of welding a high-speed steel inlay to tough steel backing. Order a set today made to your exact specifications and "Save with Simonds."

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June 21 — Carnegie-Illinois puts 6 rebuilt-coke ovens in operation a Clairton Works, Pittsburgh.

Steel truckers in Central States Ter ritory overhaul rates to approximate ly 10 per cent under rail 40,000 pound rates.

June 22—Quantity discounts in sal of cans by American Can Co. is pro hibited by ruling handed down b Federal District Court for Northern California.

June 22—Youngstown Sheet & Tub Co. says it will build four ope hearths at Indiana Harbor Works t produce about 600,000 tons of ingots When furnaces are in operation, th company will discontinue its bes semer department.

June 23—Allegheny Ludlum Stee Corp., Pittsburgh, places orders wit United Engineering & Foundry Co. Pittsburgh, for single stand 56-inc cold-reversing mill and two 30-inc cold-reversing mills for a $27.5 mil lion plant improvement program a West Leechburg and Brackenridge Pa., plants.

June 24—Communist North Korea forces invade South Korea.

June 25—Five western railroads ar struck by AFL switchmen; union i after six days' pay for five-day week Iron ore shipments from the Mesab Range are affected.

June 26—Justice Department files a civil suit against United Engineerin & Foundry Co. of Pittsburgh, charg ing it violated the Sherman Act b entering into unlawful cartel agree ments. The company issues a forma statement, denying violation of an laws.

Preliminary site preparation wor started on a new $6.5 million moto truck engineering and laborator building for International Harveste Co. at Ft. Wayne, Ind.

Upward adjustments of $6 per to on galvanized pipe announced to off set sharp increase in zinc cost.

Cleveland-Cliffs Iron Co. marks it 100th birthday.

June 27—Babcock & Wilcox Tub Co., Beaver Falls, Pa., says it wil construct a new $1 million extrusio plant for fabricating tubes of fer rous metals and alloys in comple sectional shapes.

...e 28—GM Frigidaire Division ...ounces a $12-million plant expan... ...d at Moraine City, O., suburb of D...ton.

...inless steel prices advanced to off... ...sharp advance in nickel.

...orado Fuel & Iron Corp. plans to ...and and improve facilities in Buf... ...for production of steel. Four ...n hearths will be adapted to use ...oxygen and two blast furnaces will ...improved, as well as rod mills.

...eat Lakes Carbon Corp. purchases ... St. Louis coke plant of Laclede ...s Light Co.

...ne 29—American Steel & Wire Co. ...l install latest equipment for wash... ... blast furnace gas in its Donora, ..., works.

overnment Moves Toward Conversion

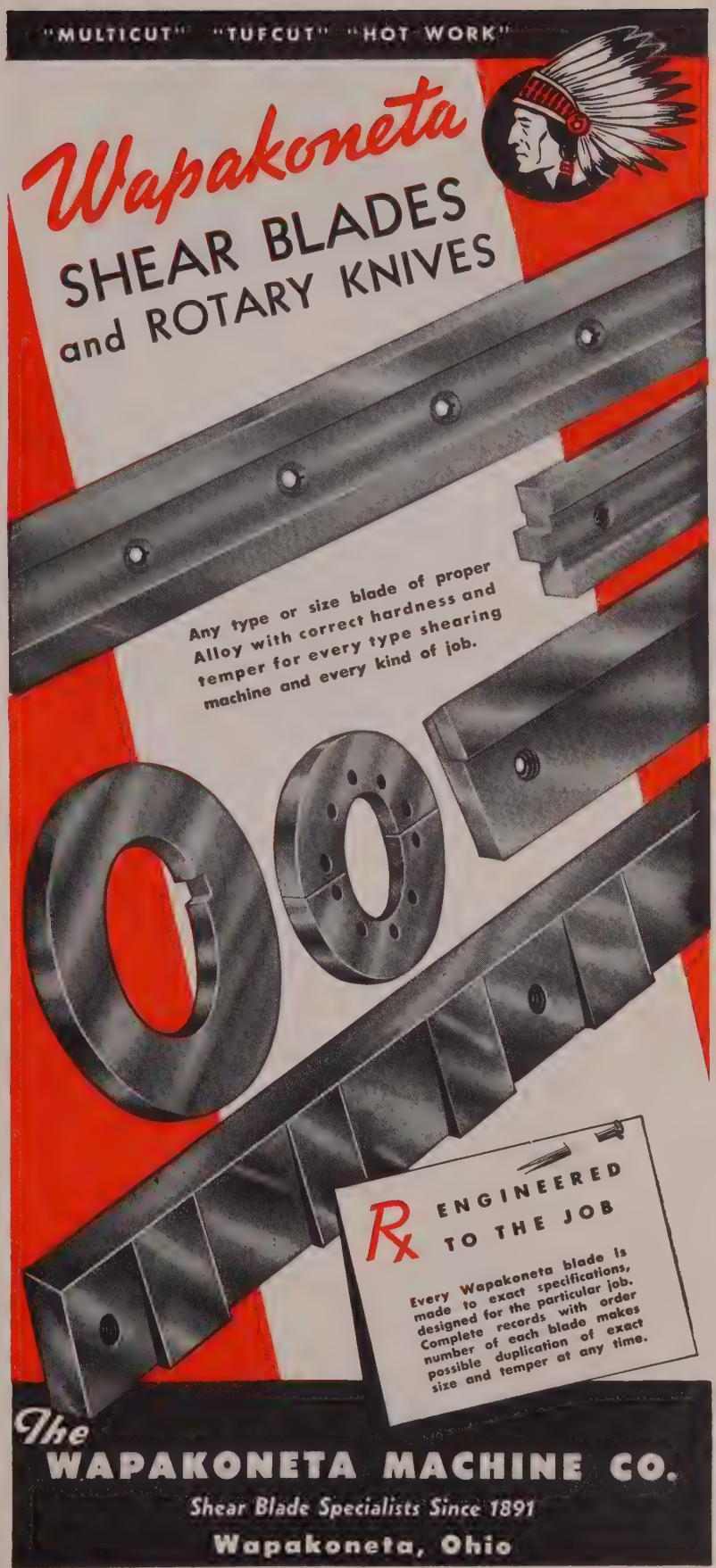
...ly 1—Solar Steel Corp., Cleveland, ...rchases the business of Edgar T. ...ard's Sons Co. Division from ...olumbia Steel & Shafting Co. at ...leveland, Detroit and Cincinnati.

...ly 2—Lukens Steel Co. marks ...0th anniversary of its founding.

...ly 7—International Nickel Co. ...tablishes a plan under which it will ...llocate sales of nickel to customers.

...ly 10—Iron ore shipments by all-...il from upper lake ranges get under ...ay to Pittsburgh and Youngstown ...istricts to ease shortage.

...ly 11—Pressed Steel Car Co. Inc. ...ells its McKees Rocks, Pa., plant, ...losed since 1949, to a syndicate that ...lans to dispose of machinery and ...quipment to create a multi-industry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Wapakoneta
SHEAR BLADES
and ROTARY KNIVES
Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.
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Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.
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It's the CONDITION ON ARRIVAL that sets the stage for your customers' feeling toward you as a supplier. Merchandise in factory-fresh condition is appreciated by the recipient.

Gaylord Boxes are protecting the products of many of the country's largest manufacturers — and have been for years.

GAYLORD CONTAINER CORPORATION, General Offices: **ST. LOUI**

New York • Chicago • San Francisco • Atlanta • New Orleans • Jersey City • Seattle • Indianapolis • Houston • Los Angele
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Hickory • Sumter • New Haven • Greensboro • Jackson • Miami • Mobile • Omaha • Philadelphia • Little Rock • Charlott

lement on the 100-acre site.

12—Dominion Foundries & Steel . authorizes issuance of 80,000 res of a sinking fund preferred k to provide additional capital building a blast furnace and e oven plant at Hamilton, Ont.

y 14 — Venezuelan government nts U. S. Steel Corp. authority to ceed on $200 million iron ore elopment program.

y 14—Donner-Hanna Coke Corp. Buffalo announces $1 million 36- te oven building program.

ly 19—U. S. Steel announces plans increase ingot capacity 1,660,000 s by fall of 1951 at Piitsburgh d Chicago.

uminum Co. of America allocates minum pig and ingot and restores ota system on fabricated products.

ly 20—Prudential Insurance Co. of merica and General American- vans Co. join in $1 billion plan build up to 100,000 new box cars r lease to railroads.

ly 22—Pittsburgh Coke & Chem- al raises pig iron prices $3 per ton.

ly 24—Electrical equipment manu- cturers raise prices 10 per cent.

uly 26—Remington Arms Co. Inc., ridgeport, Conn., and Crucible Steel o. of America, New York, form a ointly owned company to produce nd sell titanium metal and titanium etal alloy products.

uly 27—Inland Steel Co. will enlarge teelmaking capacity 750,000 tons nnually at its Indiana Harbor Works in East Chicago, Ind.

National Steel Co. of Brazil plans to expand capacity of Volta Redonda rom 343,000 to 562,000 tons of ingots and from 301,000 to 467,000 tons of finished steel.

July 28—American Association of Railroads sets up a program for construction of 122,000 freight cars at a meeting of 132 major roads in Chicago.

July 28—Carnegie-Illinois announces it will rebuild coke oven batteries at Gary and revamp the stainless steel facilities in the sheet and tin mill.

July 30—Southern railroads establish lower rates on minimum of 60,000 pounds.

with

WALLINGFORD

Custom-Tailored

STRIP STEEL

Wallingford steel is cold processed to meet your most exacting requirements. Precision rolling and slitting, with the latest equipment, provides you with your specified width and thickness tolerances every inch of the way. With this Wallingford custom-tailored strip you obtain uniform fabrication characteristics; eliminate costly production stoppages and high rejects; improve your profit picture.

LOOK TO WALLINGFORD STEEL FOR LEADERSHIP IN THE PRODUCTION OF:

STAINLESS STRIP — Up to 24" in all grades. Bright Annealed 18-8 — To 15" wide — From .005 gage. Mirror-like surface materially reduces finishing costs.

HIGH AND LOW CARBON STRIP AND COIL — Closer gage tolerances mean fabrication of more finished parts per hundred pounds of steel.

RESISTANCE WELDED TUBING — From strip to tube, every inch a Wallingford Quality Controlled product.

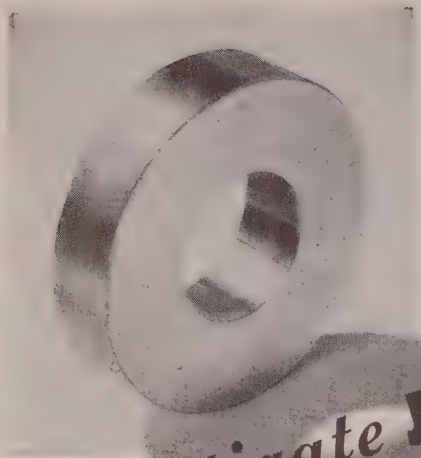
INVESTIGATE WALLINGFORD'S PRODUCTS TODAY. AN INQUIRY ON YOUR COMPANY LETTERHEAD WILL BE PROMPTLY ACKNOWLEDGED.

THE WALLINGFORD STEEL CO.

WALLINGFORD, CONNECTICUT, U.S.A.

LOW CARBON • HIGH CARBON

ALLOY • STAINLESS • STRIP and TUBING



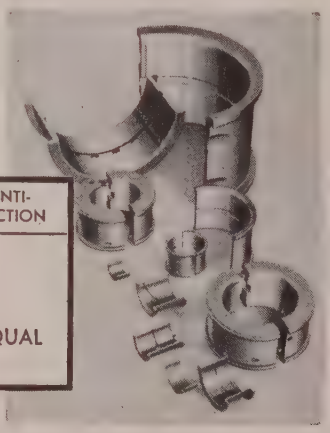
when low cost is important

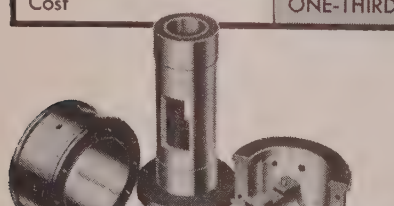
Investigate JOHNSON SLEEVE BEARINGS

YOU may be looking for a means of reducing the cost of parts and assembly time on equipment you manufacture. Here is an example of how Johnson Bronze can help. The sleeve bearing illustrated above was produced to replace an antifriction bearing in an important automotive application. It delivers equal or better performance yet costs *only one-third* as much. Multiply this saving by the thousands of units in which it is installed and you will quickly see the importance of the substitution.

check these important facts

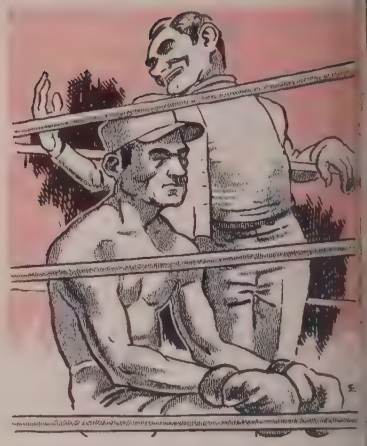
	JOHNSON SLEEVE TYPE	ANTI-FRICTION
Running Friction	LOWER	
Load Carrying Capacity	GREATER	
Resistance to Pounding	GREATER	
Precision	EQUAL	EQUAL
Cost	ONE-THIRD	





SLEEVE BEARINGS by Johnson Bronze are designed by engineers of long practical experience and years of metallurgical and mechanical research. Numerous leading manufacturers consult our specialists before designing or redesigning mechanical equipment. Such firms benefit by high bearing performance and low unit cost. You, too, are invited to write or to consult personally on bearing requirements with these Johnson Bronze Engineers.

Johnson Bronze
SLEEVE BEARING HEADQUARTERS
550 SOUTH MILL STREET • NEW CASTLE, PA.



Labor Set for Another Wage Roun

Aug. 2—U. S. Steel orders three ir ore boats and a limestone carrier.

Koppers Co. will construct coal sto age system for Weirton Steel C Weirton, W. Va.

Weirton Steel agrees to withdra recognition of Weirton Independe Union in compliance with order the U. S. Circuit Court of Appeals Philadelphia July 28.

Aug. 3—Stewart & Lloyds Ltd., Bri ish iron and steel tube manufacture negotiate contracts with Americ firms for the production of steel pi for shipment to U. S. at cost of $5 million.

Jessop Steel Co. puts into effect reorganization plan which clears wa for $1 million RFC loan.

Aug. 4—Columbia Steel Co. leas from the government the steelmal ing facilities of wartime steel foun ry adjacent to its Pittsburg, Cali plant.

Aug. 5—CIO-Steelworkers renew o ganization drive of Weirton Ste employees.

Armco announces plans to spen $1.5 million to modernize and expan its Zanesville, O., plant.

Aug. 6—Carnegie-Illinois announc plan to install 2 new turboblowe that will increase output of 6 bla furnaces by 800 tons daily in Youngs town district.

Republic Steel announces plans to en large 100-ton furnace to a 200-to unit at Buffalo and install a 125,00 cfm turboblower at the No. 5 fur nace in Cleveland.

7—A new independent union is ized at Weirton, W. Va., called ndependent Steelworkers Union.

ward Iron Co., Woodward, Ala., first blast furnace in the dis- since 1908.

8—Pittsburgh Steel Co. buys a lift blooming and slabbing mill United Engineering & Foundry.

10—Central Iron & Steel Co. letes arrangements for the pur- of the Chester, Pa., blast fur-

12—The Alpine-Montan Gesell- announces plans to build a rail structural mill, rated at 165,000 per year, at an estimated cost 1 million, of which ECA will ibute $2 million.

13—Salem Engineering Co., To- , Ont., gets contract to make a y for a steel plant for Corpora- Venezolana de Fomento of Cara- Venezuela.

15—U. S. Steel announces Co- ia Steel Co. subsidiary will add 00 tons annual ingot capacity ttsburg, Calif., and Geneva Steel 100,000 tons.

16—Copperweld Steel Co. buys facilities built by RFC during ld War II at Warren, O., plant $2 million, including 3 electric aces already under lease to the pany.

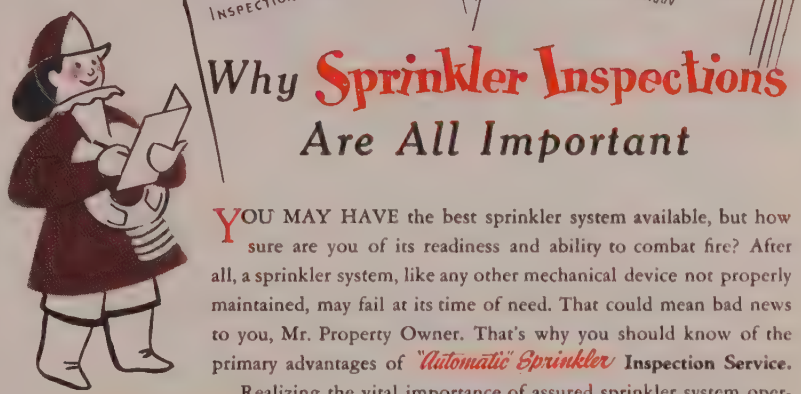
17—New sintering plant put operation at Edgar Thomson ks of Carnegie-Illinois.

lehem Steel and a Brazilian com- , Industria e Comercio de Mine- (Icomi) plan development of anese deposits (estimated be- n 10 and 20 million tons of ore ves assaying 44 per cent man- se or better) in the lower Ama- Valley.

21—Loftus Engineering Co. re- s $500,000 contract for the en- ering of five open-hearth fur- s for the Finsider Co. in Italy the Cornigliano Works near a.

22—Vulcan Mold & Iron Co. s to build a $1-million plant in ago area to avoid losing busi- because of freight rate increases.

k interest in E. & G. Brooke



Why Sprinkler Inspections Are All Important

YOU MAY HAVE the best sprinkler system available, but how sure are you of its readiness and ability to combat fire? After all, a sprinkler system, like any other mechanical device not properly maintained, may fail at its time of need. That could mean bad news to you, Mr. Property Owner. That's why you should know of the primary advantages of "Automatic" Sprinkler **Inspection Service.**

Realizing the vital importance of assured sprinkler system operation, "Automatic" Sprinkler, at the advent of its business some 55 years ago, established an **Inspection Service** Department. **Inspection Service,** which is handled only by individuals thoroughly familiar with all types of sprinkler equipments, actually augments periodic insurance bureau inspections and provides you with a double check on the general efficiency of your fire protection equipment.

Inspection Service detects minor irregularities and provides for correction before major repairs are necessary. It brings to your attention the need of extensions to your present equipment should property expansion so demand. In short, "Automatic" Sprinkler **Inspection Service** is an integral factor in every over-all fire safety program and its true value worth considerably more than is the small annual charge that is made for it.

Don't wait for fire to strike and then hope for the best. Be assured through **Inspection Service** that your fire protection will really protect, today—tomorrow—next week or whenever it is needed. "Automatic" Sprinkler Corporation of America, Youngstown 2, Ohio.

"Automatic" Sprinkler

FIRST IN FIRE PROTECTION

DEVELOPMENT · ENGINEERING MANUFACTURE · INSTALLATION

OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

You profit by CLEVELAND'S policy of Specialization

Keeping "expert" in producing only Cap Screws, Set Screws and Milled Studs—plus "specials" made to customers' designs—is assurance that Cleveland's policy of Specialization brings you *Top Quality* Fasteners. We concentrate on making a *few* items *well*. . . . It's important, too, that by specializing we can make the much abused word "Service" really *mean* something . . . . It pays you to specify and buy Cleveland *Top Quality* Fasteners.

THE CLEVELAND CAP SCREW COMPANY

2917 East 79th Street, Cleveland 4, Ohio

Warehouses: Chicago, Philadelphia, New York, Providence

CLEVELAND *Top Quality* **FASTENERS**

ORIGINATORS OF THE KAUFMAN DOUBLE EXTRUSION PROCESS

Specialists for more than 30 years in

CAP SCREWS, SET SCREWS, MILLED STUDS

Ask your jobber for Cleveland Fasteners

Iron Co., Birdsboro, Pa., held
Lukens Steel Co., Coatesville, P
and Worth Steel Co., Claymont, D
purchased by Bayou Interests, I

Aug. 23—Senate Finance Committ
adopts five-year depreciation pro
sion for war plants and facilities
part of its interim defense tax b

Aug. 25—Chrysler Corp. announc
10 cents an hour wage boost to ho
ly rated employees.

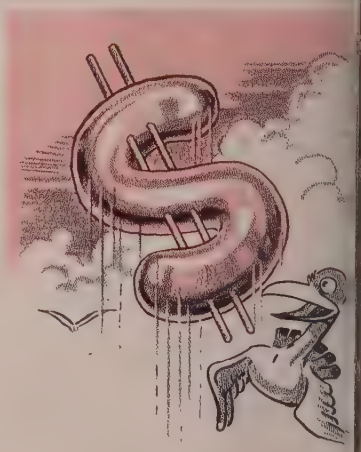
Aug. 26—Army takes over the r
roads and averts a nation wide stri

Aug. 28—President Truman sig
bill that brings 10 million additio
persons under social security plan

Aug. 30—H. C. Frick Coke Co.
nounces a new 4000-ton a day c
mine will be opened in Washing
County, Pa., and another mine ab
the same size, which was closed si
1928, will be reopened in Faye
County, Pa.

Cast Iron Pressure Pipe Institute
tablishes voluntary priority syst
that will give preference to milit
requirements.

September



Inflation Rises Rapidly

Sept. 3—Armco to spend at least
million to modernize its Ashland,
plant, which includes a modern s
bing mill and equipment to pro
72-inch wide coil.

Sept. 5—Ford Motor Co. raises
of most hourly rated employee
cents an hour.

Sept. 8—Copper shortage forces

RINGS *Safety* AND *Efficiency*

to STEEL MILL OPERATIONS

Recognized throughout the iron and steel producing industry for dependability and highest quality, Bailey equipment meets the vigorous requirements of many vital operations. Some of the principal items of Bailey equipment are shown on these pages.

MECHANICAL TYPE

Bailey Goggle Valves provide a tight, positive seal for shutting off gas mains in emergencies or for repairs. They operate by a powerful clamping force which is applied equally at all points around the disc periphery. Regardless of time between operations, they open or close instantly. Sizes from 6" to 72", totally enclosed if desired.

BAILEY GOGGLE VALVES

THERMAL EXPANSION TYPE

The Bailey Thermal Expansion type Goggle Valve is operated by the linear expansion and contraction of the three sets of tubes spaced around the rigid steel flange. When steam is passed into the tubes, thermal expansion of the tubes frees the goggle plate. When the steam is removed, contraction closes the flanges against the goggle plate. Diameters of 36" to 120"

WILLIAM M. **Bailey** COMPANY

ENGINEERS

LEADERSHIP THROUGH QUALITY

1221 BANKSVILLE ROAD PITTSBURGH 16, PA

How GREAT NORTHERN RAILWAY Makes Short Work of Heavy Cutting —using this "Buffalo" BILLET SHEAR

Efficient maintenance is one of the reasons why Great Northern "keeps 'em rolling" so well. The "Buffalo" No. 9 Billet Shear above, in their St. Paul shops, helps speed this maintenance. Here it is making short work of cutting ⅜" x 4" spring leaf for caboose springs. It's also used for cutting rounds, flats and angles. Note the clean cuts. 10 other sizes are ready to speed up any cutting job you may have, up to 10" rounds. WRITE FOR BULLETIN 3295-A for complete details.

BUFFALO "Buffalo" FORGE COMPANY
158 Mortimer St. Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING CUTTING SHEARING BENDING

perweld Steel Co. to reduce produ tion schedule.

Allegheny Ludlum plans to constru $2.5 million electric furnace shop Watervliet, raising capacity to 80,0 tons.

Sept. 9—Federal Reserve Board r installs consumer credit controls restrain inflation.

Sept. 10 — National Production A thority is established.

Sept. 11 — Aluminum Associati states output at 1.4 billion pou annual rate, 17 per cent over 1949.

Sept. 12—Ford Motor Co. says $3 million is being spent on new plan and equipment, including in the st plant portion new equipment to ha dle coils up to 66 inches wide weig ing 50,000 pounds; 12 annealing fu naces; 9 radiant gas tube furnace conveyor equipment; and temp mills.

Cleveland-Cliffs Iron and Interla Steamship each order 18,000-ton ir ore carrier.

Sept. 17 — Alabama By-Produc Corp. awards Koppers Co. 29 n coke oven contract for Tarrant, Ala

Ohio River Steel Corp. acquir works at Toronto, O., formerly own by Follansbee Steel Corp.

Sept. 18—NPA announces invento control order covering 32 scar items; consumer credit curbs also p into effect.

Republic Steel and Armco announ a joint $160 million taconite dev opment program, which includes pu chase of 100 per cent ownership Reserve Mining Co.

Sept. 20—Colorado Fuel & Iron Co buys 175-acre tract of undevelop land adjacent to its Wickwire Spe cer Steel Division's plant at Buffa

Sept. 21—Harry M. Moses resigns president of H. C. Frick Coke C and U. S. Coal & Coke Co. to becon president of Bituminous Coal Oper tors' Association.

Sept. 22—Alcoa vounteers 10 per ce wage increase to hourly paid em ployees; CIO-Steelworkers acce on Sept. 26 with understanding th will seek another after settleme with U. S. Steel.

Sept. 25—Allegheny Ludlum is r ported to be acquiring 35 per ce interest in Continuous Metalca Corp., a new firm that will ow

it to a process for continuous
ti of metals. American Metal
d. and Scovill Mfg. Co. will
have 10 per cent interest in the
other 45 per cent of the stock
edly goes to Irving Rossi,
of the continuous casting
es.

o raises aluminum pig and ingot
ents per pound and advances
ated products; other interests
ollow with similar price action.

orkers petition NLRB for
shop vote among major steel
ers.

26—Republic Steel, Youngs-
Sheet & Tube, Interlake and
raise pig iron $3 a ton.

28—Geneva Steel Co. awards
ers Co. a contract for 23 coke
at its Ironton plant.

28—Southern California's syn-
rubber plants, idle since end
orld War II, are alerted to
re for immediate operation.

29—Kaiser starts $125 million
cing program, about $24 million
hich will be used for expansion
am, which will include facilities
00,000 tons of hot dipped and
olytic tin plate and additional
on open hearth, soaking pits and
ning mill facilities.

essee Coal, Iron & Railroad Co.
unces 500,000-ton ingot expan-
program.

30—NPA announces synthetic
er allocation will be based on
mption during 12 months end-
une 30 last.

s Steels Ltd. plans installation
cold-mill for stainless sheets.

ort controls on 38 classifications
on and steel products reimposed
ll countries except Canada.

w steel producers advance prices;
or interests delay taking action.

October

2—First portion of 150,000 tons
German scrap for U. S. Steel's
sburgh mills arrives at Balti-
e.

retary Sawyer says steel industry
increase ingot capacity to about
million tons, blast furnace capa-
to 73.4 million tons by the end
952.

The ABC of MST

Michigan

The Modern Electric Resistance

WELDED STEEL TUBING

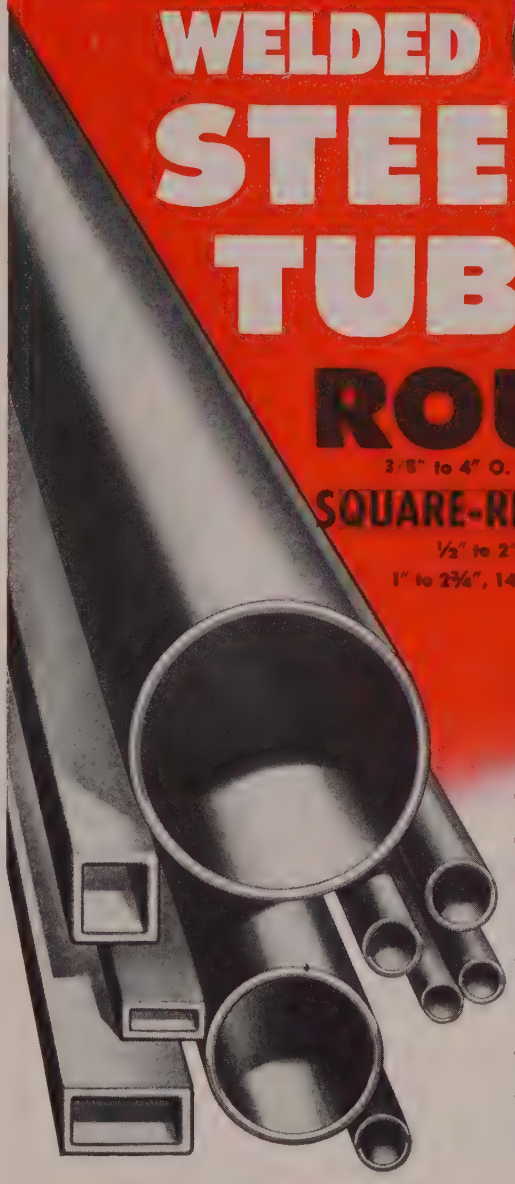
ROUND

3/8" to 4" O. D. 9 to 22 gauge

SQUARE-RECTANGULAR

½" to 2" 20 gauge

1" to 2¾", 14, 16, 18 gauge



ALWAYS MAKES POSSIBLE
BETTER PRODUCTS
AT LOWER COST

Thousands of products, from intricate automobile and truck parts to furniture and vacuum cleaners, are made better and more economically with MICHIGAN TUBING. We invite you to consider the many advantages of using it in the fabrication of YOUR product.

A Quality Product, can be worked in your plant or prefabricated by MICHIGAN.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

RESISTANCE-WELDED STEEL TUBING

Michigan STEEL TUBE PRODUCTS CO.

THE OLDEST NAME IN ELECTRIC

33 Years in the Business

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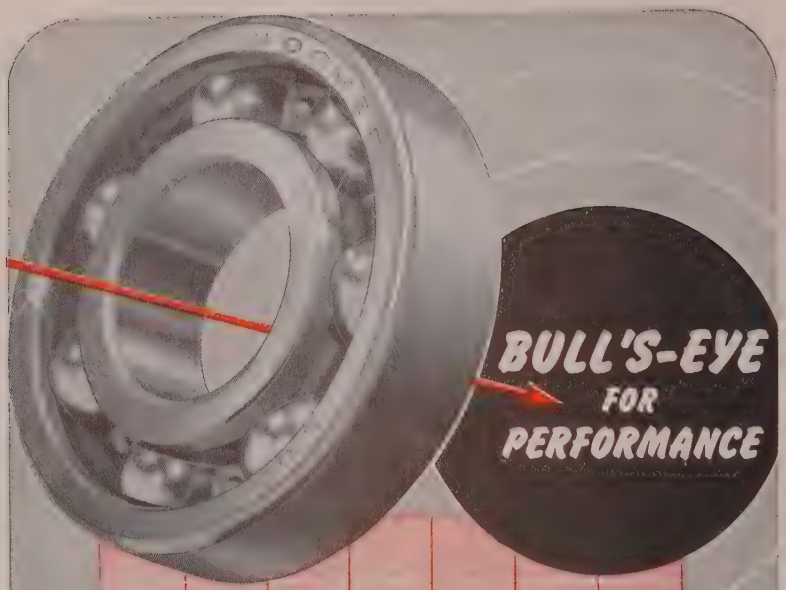
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—A. J. Fitzgibbons Co., Buffalo, N. Y.



BULL'S-EYE FOR PERFORMANCE

90% LONGER LIFE

30% GREATER LOAD

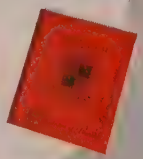
HOOVER BALL BEARINGS

with

HONED RACEWAYS

You are not buying bearings, you are buying performance . . . bearing life, load capacity, quietness. In performance Hoover, America's only ball bearing with honed raceways, gives you the most for your money. When you specify and buy Hoover Ball Bearings you buy unbelievable quietness plus 90 per cent longer life, 30 per cent greater load capacity. A growing list of distinguished American manufacturers of quality machines and equipment are finding that their bearing dollars buy more value when they select Hoover.

Engineering and purchasing executives are invited to write for the Hoover Engineering Manual.



THE ARISTOCRAT OF BEARINGS

HOOVER BALL and BEARING CO.

Ann Arbor, Michigan

Oct. 3—Basic rules of priorities s tem announced.

Sharon Steel starts $49 million f year expansion program. It incl an 800-ton blast furnace, the enl ing of eight open hearths and stallation of blooming and contin hot-strip mill.

Oct. 4—CIO-Steelworkers ask s producers to reopen contracts ah of time to negotiate wage increa

Oct. 9—Rail rates on import ore from Baltimore and Philadel to Pittsburgh reduced 28 cents gross ton; reductions to other west points range up to 68 c Eastern railroads also publish lo import pig iron rates.

Tank Program Underway

Great Britain appoints seven- steel industry board to effect Na alization Feb. 15.

Oct. 11—U. S. Steel agrees to re contract negotiations on Oct. 16 CIO-Steelworkers on wage issue.

H. K. Porter Co. Inc., Pittsbu buys Connors Steel Co., Birmingh

Oct. 12—NPA establishes maxi percentages of defense orders steel producers are obliged to ac

Oct. 13—General Electric opens million research laboratory.

Oct. 16—H. K. Porter Co. Inc. its locomotive business to Daven Besler Corp., Davenport, Iowa.

Keystone Steel & Wire plans to crease open-hearth capacity by per cent.

Armco Steel Corp. starts produc

v $12-million open-hearth plant ddletown, O. and announces a illion program to expand ingot ity 27 per cent by 1952.

ed Steel Car Co. Inc. unveils a freight car that uses 20 tons teel than conventional unit.

17—Brainard Steel Co., Warren, eases $7 million government- i plant at Warren, O.

gstown Sheet & Tube Co. an- es it plans expenditure of about million on improvements at gstown district plants.

19—NPA orders output and sale olumbium alloys restricted to orders.

23—Lone Star Steel Co. begins tion of new $1.5 million cast pressure pipe foundry at Dain- eld, Tex.

24—Kaiser Steel Corp. refin- s: 234 investment underwriters Kaiser $40-million stock issue. rance companies and banks lend million; funds marked for pay- of RFC debt and expansion.

25 — Graham-Paige buys steel , purchases all capital stock of tney-Apollo Corp., Apollo, Pa.

27 — Supplement to amended regulation M-1 issued, covering ght car program.

Steelworkers are defeated at rton. Certification of IUE held by NLRB pending investigation IO objections to the election.

minum producers told they will bliged to accept up to 25 per cent utput for defense orders.

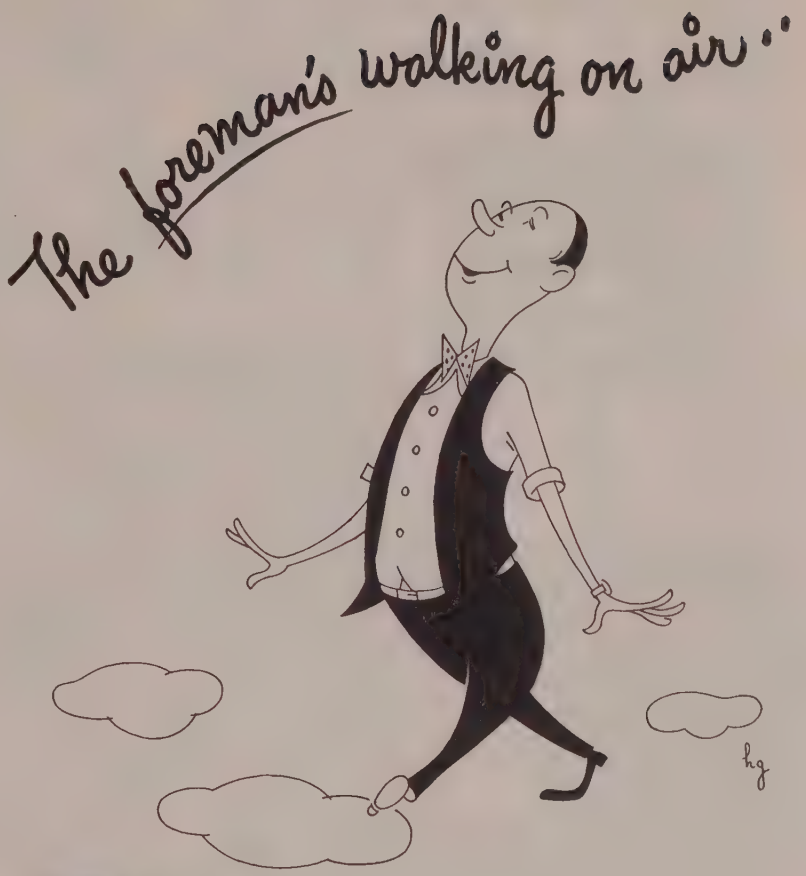
31—Sloss-Sheffield Steel & Iron awards contract to Koppers Co. new coke oven battery at Bir- gham.

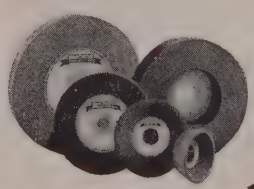
November

v. 6—Carnegie-Illinois announces ew group of multiple-alloys to be wn as T-steels.

v. 7—Colorado Fuel & Iron Corp. nounces plant expansion program cost $26.2 million.

S. Steel Corp. announces plans to rge Carnegie-Illinois, Delaware





SIMONDS ABRASIVE CO.
grinding wheels

Production up . . . costs down . . . and rejects rare as a February heatwave. No wonder the grinding foreman is uplifted. And here's the reason. He's using grinding wheels exactly suited to his jobs. They're Simonds Abrasive Company wheels . . . part of a complete line including grinding wheels, mounted wheels and points, segments and abrasive grains . . . all accurately specified, rigidly tested and scientifically produced under complete quality control by Simonds Abrasive Company, a major manufacturer of grinding wheels for over 50 years. Write for free data book.

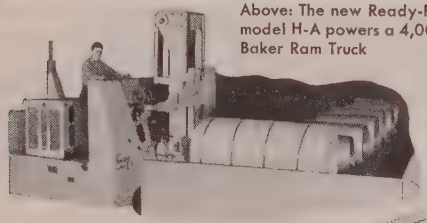
SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

ANY Electric Truck can be Equipped with READY-POWER

CONTINUOUS DUTY
GREATER EFFICIENCY
LOW OPERATING COST
LITTLE MAINTENANCE

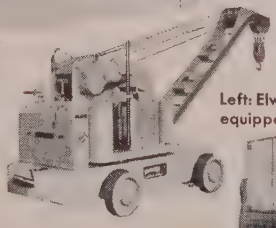
Only Ready-Power Gas-Electric Units provide efficient electric truck operation *continuously*. Because power is generated right on the truck chassis there are no limitations . . . no slow-downs. Ready-Power Units are famous for operating economy, too. There are models to improve the performance of all types and sizes of electric trucks.



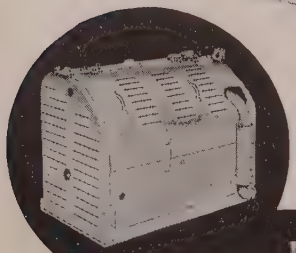
Above: The new Ready-Power model H-A powers a 4,000 lb. Baker Ram Truck

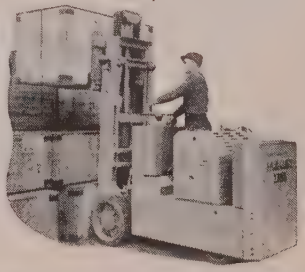
Above: This 3,000 lb. Lewis-Shepard Fork Truck is equipped with a Ready-Power model P

Above: Ready-Power model J gives this 30,000 lb. Baker plenty of power for handling heavy steel coils



Left: Elwell-Parker 10,000 lb. Crane Truck equipped with Ready-Power model L-2

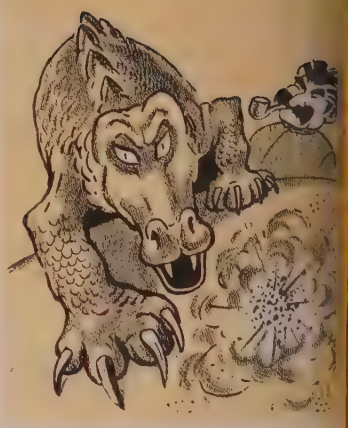




Right: Ready-Power model H powers this 4,000 lb. Mercury Fork Truck

THE READY-POWER CO.

3824 Grand River Ave., Detroit 8, Michigan



China Enters Korean War

corporation, H. C. Frick Coke C and United States Coal & Coke on Jan. 1 into one company to known as U. S. Steel Co.

Ford announces plans to manufact B-36 engines in Chicago plant.

Nov. 8—NPA regulation M-6 cov ing steel distributors issued.

Nov. 10—Timken Roller Bearing offers steelworkers 10 per cent w increase; offer accepted Nov. 14.

Nov. 11—Jones & Laughlin S Corp. says installation of a high-speed halogen-type electrol line in 1951 at Aliquippa Works double electrolytic tinning capaci

Nov. 13—Aluminum customers they will get only 65 per cent average monthly shipments recei during first half of 1950; eased 80 per cent for January and 75 cent during February early in Dec ber. NPA order M-8 covering is issued.

Nov. 15—Jones & Laughlin oper ore mine at Negaunee, Mich.

Empire Steel Corp. announces pl to spend $10 million for expan program at Mansfield, O.

Nov. 16—NPA order M-9 cove zinc is issued.

Nov. 17—Republic Steel Corp. nounces 672,000-ton ingot capa expansion program to cost $75 lion, including 4 open hearths; 1 ton blast furnace; 126 coke ov 72-inch tandem cold reducing n new soaking pits; and improveme to blooming mill.

Nov. 20—Granite City Steel Co. ports plans are under considera

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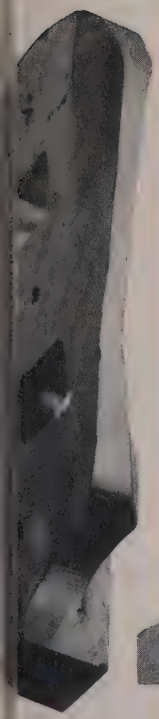

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For faster production of jet parts, TV cones, or experimental designs, call Teiner. Capacity is immediately available for sheet metal working and spinning of all metals.

Automatic machines for TV cones, power tools for spinnings up to 16 ft. and facilities for handling stainless steel and new Timken alloy can be applied to your fabrication needs.

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for a $50 million expansion progra that will double productive capacit

Copperweld Steel Co. announces plan for a major expansion and improve ment program at its Warren, O steel plant at cost of $1 million.

Firestone Tire & Rubber Co. engage the Chemical Plants Division Blaw-Knox Co. to reactivate the 30 000-ton synthetic rubber plant Louisville.

Nov. 24—Koppers Co. opens but diene unit at Kobuta, Pa.

Forty-eight hour blizzard forces nea complete cessation of steel operation in Pittsburgh, Youngstown an Cleveland, resulting in decline in th national steel ingot rate of 21 point in the week ended Dec. 2.

Nov. 26—UN forces in Korea beat retreat in face of strong Red drive.

Nov. 27—Jones & Laughlin Ste Corp. becomes the first major ste producer in the present emergenc to get government authority to writ off its defense expansion in fiv years. Company was granted neces sity certificates for expansion by Na tional Security Resources Board.

Nov. 28—Reynolds, Kaiser and Alco announce expansion plans totalin 640 million pounds annually, all which is to be earmarked for stock pile; two-thirds of reactivated out put also to be stockpiled.

Nov. 30—NPA order M-10 coverin cobalt is issued.

December

Dec. 1—Steel prices, wages go u

Steelworkers get average increase 16 cents an hour, with a range fro 12½ to 28 cents. Weirton and Armc employes win slightly larger wag boost. Advance on finished steel ave ages $5.50 a ton.

NPA regulation, covering nickel, i sued. Order M-6 in steel distributio amended.

Dec. 2—Cleveland - Cliffs Iron Co raises iron ore price 60 cents a to

Dec. 4—Baldwin Locomotive Work announces purchase of all the asset of Lima-Hamilton Corp. Name Baldwin Locomotive Works changed to Baldwin-Lima-Hamilto Corp.

Automobile parts being protected for export shipment. (Left) Hoods and cowls pass through continuous criss-cross spray of NO-OX-ID before crating. (Right) Small parts are dipped in NO-OX-ID.

POSITIVE PROTECTION FOR YOUR PRODUCTS WITH DEARBORN NO-OX-ID

Whether you manufacture products for export or domestic markets —if they are made of metal, they need protection against the costly, constant threat of rust.

Whether your products require a coating that is transparent, heat resisting, cold resisting, lubricating or dry to the touch, there is a correct NO-OX-ID for your use. There is also a method of application suited to your operation. NO-OX-ID may be ap›lied by hot or cold dip—either by hand or conveyor. It may be sprayed or brushed on—it may be protected in NO-OX-IDized wrappers.

NO-OX-ID will also play an important part in protecting the equipment in your plant, your out-buildings, storage tanks, and metal surfaces wherever corrosion threatens. Lower maintenance costs are made possible with NO-OX-ID.

Dearborn has been serving industry since 1887—put these years of experience to work for you, preventing corrosion on your products and in your plant. Consult with a Dearborn Engineer—he will advise you as to which NO-OX-IDs are best suited to your needs.

DEARBORN CHEMICAL COMPANY

General Offices: **310 S. Michigan Ave. • Chicago 4, Ill.**

Dearborn

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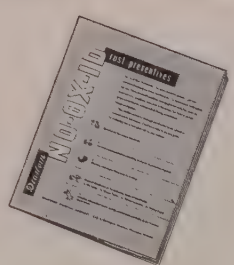
THE ORIGINAL RUST PREVENTIVE

NO + OX + ID = RUST IRON



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A complete introduction to Dearborn NO-OX-IDs with valuable information to help you protect against rust in your plant and on your product. Mail the coupon.

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Chicago 4, Ill.

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Company.....

Title.....

Address.....

City.....*State*.....

OVER ONE HUNDRED YEARS OF CONTINUOUS SERVICE. ROUNDS, SQUARES, FLATS, HEXAGONS, OCTAGONS

BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS.

even tempered, but TOUGH!

HY-TEN "B" No. 3X

If you need even temper and toughness on heavy-duty parts, by all means investigate the unusual properties of HY-TEN "B" No. 3X!

WL can supply "B" No. 3X in bars, discs, flats or forgings heat treated to your exact hardness specifications. And this unusual HY-TEN alloy steel can be machined even when hardened as high as 477 Brinell (48 Rockwell "C")!

This unusual property—*machinability at high degrees of hardness*—makes this steel particularly well suited for parts which are apt to distort badly in the treating operation. This makes possible savings in handling and set-up time and finishing operations by putting parts into service without further treatment. A smoother finish is obtainable at almost any degree of heat-treated hardness than is possible with standard alloy steels.

WL *steels are metallurgically constant. This guarantees uniformity of chemistry, grain size, hardenability—thus eliminating costly changes in heat treating specifications.*

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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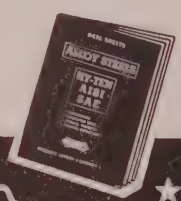
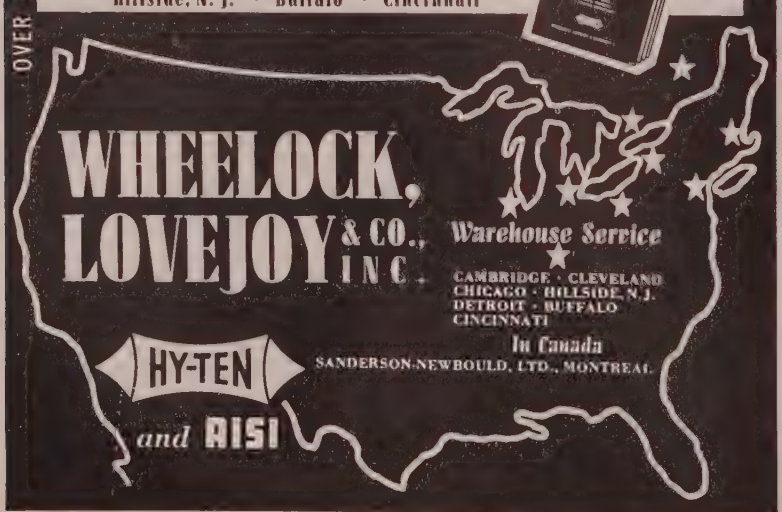




Dec. 5—General Motors and Ford raise prices on 1951 models.

RFC grants $25 million loan to Kaiser-Frazer Co. to help maintain auto output and get into defense production.

Dec. 6 — Steel producers establish basing point prices on scrap in about 40 districts, at same time raising prices in the few cities where "formula" quotations were previously established. Pittsburgh price at $46.50 for No. 1 heavy melting compared with $30 in January, is the highest level of the year.

Dec. 7—GM, Ford and other auto makers asked to rescind price increases on '51 models.

Dec. 8—Automakers give government polite but firm "no" on requests for recision of price increases.

Jones & Laughlin Steel announces additional expansion program at Pittsburgh, Aliquippa, and Cleveland Works, which includes two 225-ton open hearths and 1200-ton blast furnace at Cleveland; rod mill at Aliquippa; five additional open hearths, bar and slabbing mill at Pittsburgh.

Tennessee Coal, Iron & Railroad Co. opens its new Concord coal mine rated at 7500 tons of washed coal per day.

Dec. 13—Certificates of necessity for expansion programs granted to 11 steel companies for $469 million. The expansion will add 5.5 million tons of ingot, 2.5 million tons of coke and 2.75 million tons of pig iron capacity annually.

Two new steel companies, Green River Steel Corp., Owensboro, Ky., and Hazleton Steel & Tubing Co., Hazleton, Pa., revealed.

Wildcat strike of 10,000 Chicago railroad yard workers starts. Army charges it directly hurts Korean war effort.

Dec. 15—General Electric's C. E. Wilson accepts the job of director of the Office of Defense Mobilization.

House votes and sends to the Senate a $17,809,304,424 emergency defense appropriation bill, for year's total of $42 billion.

Railroad yard workers strike spreads to ten cities. Government orders contempt action to be brought.

16—A national emergency is de- l to exist by President Truman. alls for: A stern economic and ower program, price controls on tial defense items and products sary to keep the cost of living ., expansion of the Army, Navy Air Force (increase in military ower to 3.5 million men), taxes er than any proposed thus far, duction in nonmilitary spending, lization of wages and longer s.

price rollback to Dec. 1 price is ordered by the Economic Sta- ation Agency.

17 — Economic Stabilization ncy says it is ready to ask the n's manufacturers to clamp a ntary lid on prices and wages, ting development of compulsory rols.

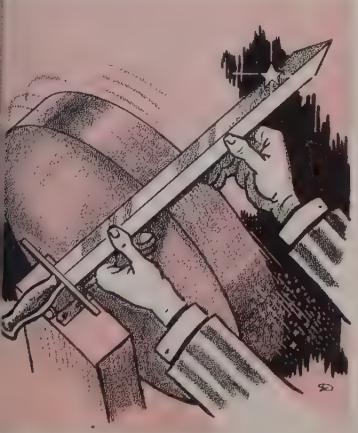
18—General Motors orders halt- of sales of its 1951 models pend- talks with the government on ification of its price rollback or- on automobiles.

19—American business and in- ry is asked by the government to l prices at the Dec. 1 level until rice control setup is worked out.

nomic Stabilization Agency re- s General Motors' plea to modify government order blocking price reases on 1951 models.

20 — Senate passes an excess fits tax bill designed to drain $3.2 ion from corporations this year.

nomic Stabilization Agency asks large companies (with annual siness in excess of $500,000) out- e the auto industry to try to give en days' notice before raising ces on any major products.



Uncle Sam Sharpens Up

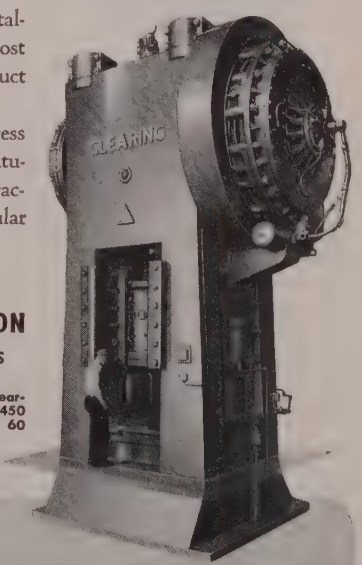
does sweat make a product better?

Yesterday's blacksmith, for all his poetic sweat, couldn't begin to match, in quality or quantity, the output of a Clearing forging press.

Human labor is too costly to be wasted. Today's manufacturer must make machinery do more and more of his productive work. When he turns to Clearing presses for forging or other metal-shaping operations, he obtains maximum cost efficiency and usually an improved product as well.

That's because Clearing has carried press development far beyond the mere substitution of machines for muscle. There's a practical and economical answer to your particular metalworking problem.

Why don't you ask us?



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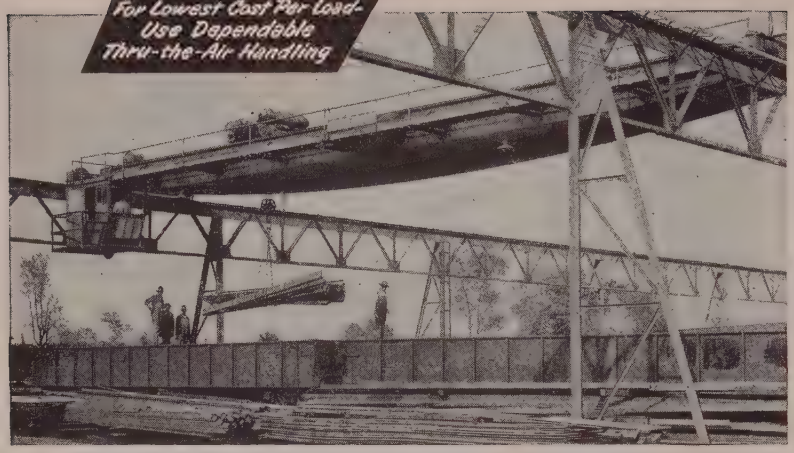
One man and this Clearing press can forge 450 connecting rods in 60 minutes.

CMC CLEARING

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION



This installation required built-up plate, welded box construction . . . fish-belly design . . . enclosed cab . . . complete weatherproofing . . . main and auxiliary hoist units (see illustration below).

How to get the most CRANE for your money

When you buy a crane, make sure you select the machine best qualified to do *your* job! The work for a crane in your plant probably differs from that in your neighbor's plant. The general crane rating and other details which are perfect for his handling problems may not be at all suitable for yours. To get the most crane for your money, let *crane duty* determine *your* choice.

It isn't entirely a matter of capacity. Travel speeds, hoisting speeds, frequency of use—all call for special consideration in the choice of a crane. That's why it's wise to discuss your problem with a Shepard Niles specialist. It's much less costly to install the *right* equipment in the beginning—than to make important changes later.

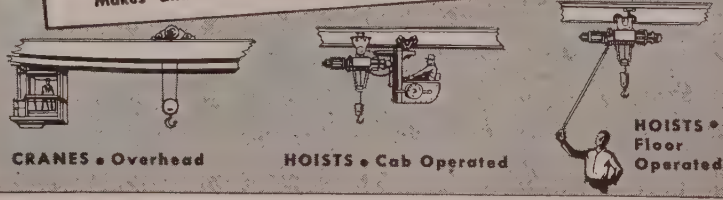
MAIN AND AUXILIARY HOISTING UNIT—Recommended for duty where there is a wide range in the capacity handled. Auxiliary hoist handles lighter loads at greater speeds than can be obtained with the main hoist.

It costs you nothing to get the facts. May we place our extensive material-handling experience at your disposal?

Shepard Niles

CRANE & HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads



CRANES • Overhead

HOISTS • Cab Operated

HOISTS • Floor Operated

358 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

Worker Efficiency Up

A new instrument developed by Minneapolis-Honeywell adds to worker and machine efficiency

BASED on the fact that air conducts more electricity when moist than when dry, a new electronic hydrometer for measuring and controlling industrial and commercial air conditioning has been developed by Minneapolis-Honeywell Co. M-H engineers have proved that the new instrument adds to worker and machine efficiency.

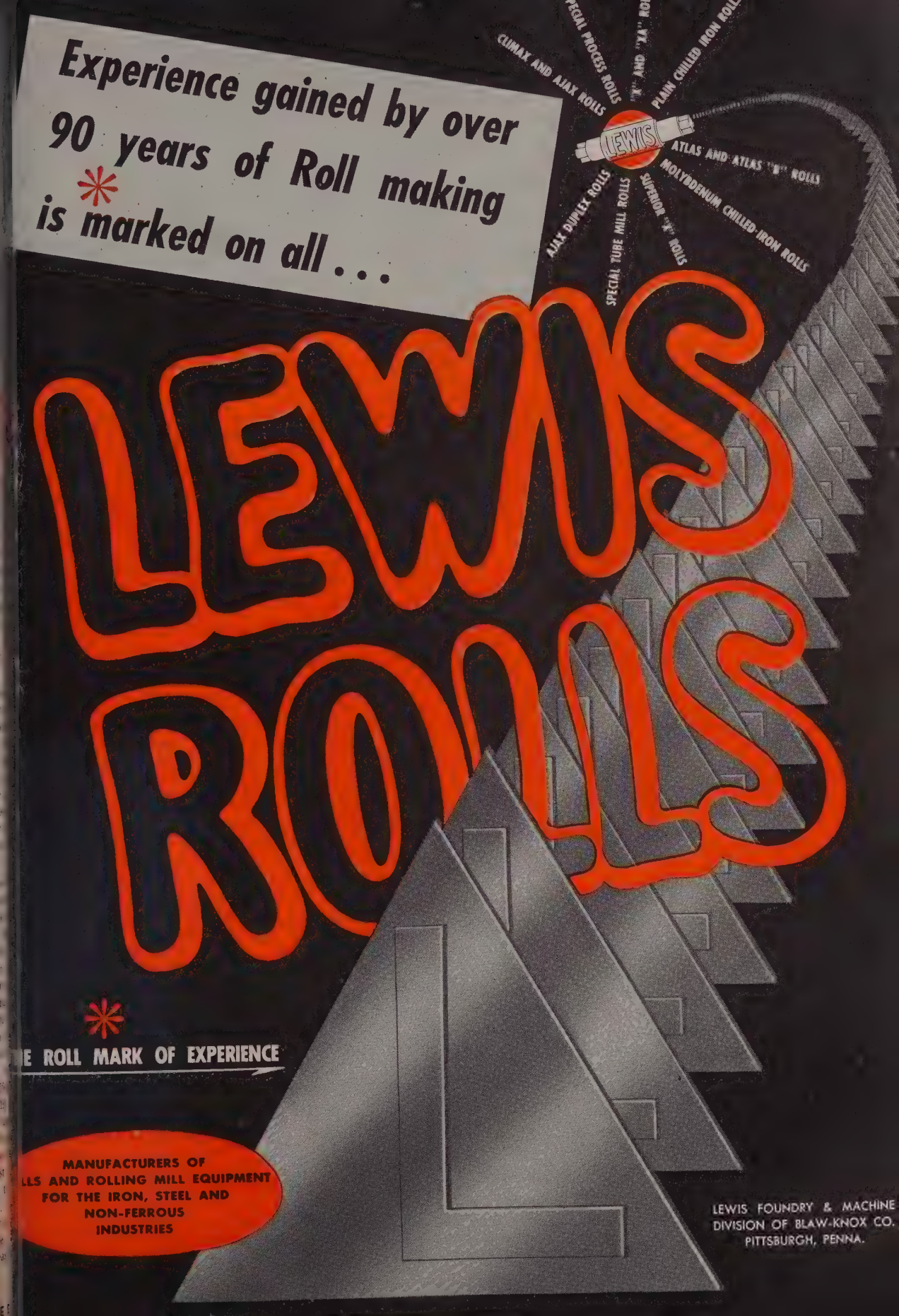
"The system includes a single-point ElectroniK recorder of a circular strip-chart type, with or without control and a small element which does away with the use of human hair," said Brown engineers. "The element makes use of gold leaf and a chemical salt solution that eliminates cleaning and other maintenance."

The company listed as advantages of the system its provision for direct relative humidity reading without assistance of psychometric charts; its use for sensing changes between the limits of 20 and 93 per cent relative humidity; its minimum span of 5 per cent relative humidity throughout its 20 to 93 per cent range, and availability of all ranges with full temperature compensation between the limits of 50 to 120 F.

"The system's ability to provide remote reading provides operation over distances up to 1000 feet, making possible centralized control of a complete installation from a supervisory panel," the engineers said. "Unit control is available adjacent to the critical zone being controlled. Remote transmission allows supervisory monitoring of multi-unit, single zone control.

"The instrument is calibrated to plus or minus one per cent accuracy, allowing relative humidity to be held within closer tolerances than previously possible. Responsiveness of the sensing element is much greater than 'dimensional-change' type hygrometers; 63 per cent of total change is registered in 10 seconds. Minimum maintenance is featured due to complete air filtration and elimination of psychrometric accessories. The sensing element is generally unaffected in corrosive atmospheres normally encountered in industrial working areas.

"This means more accurate measurement and closer humidity control. Installation is simplified and cost, due to water lines, wicks, porous tubes and accessories are eliminated. Centralization of instruments provides single location supervision over remotely located multi-zone measurements."


Experience gained by over 90 years of Roll making * is marked on all . . .
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ATLAS AND ATLAS "B" ROLLS
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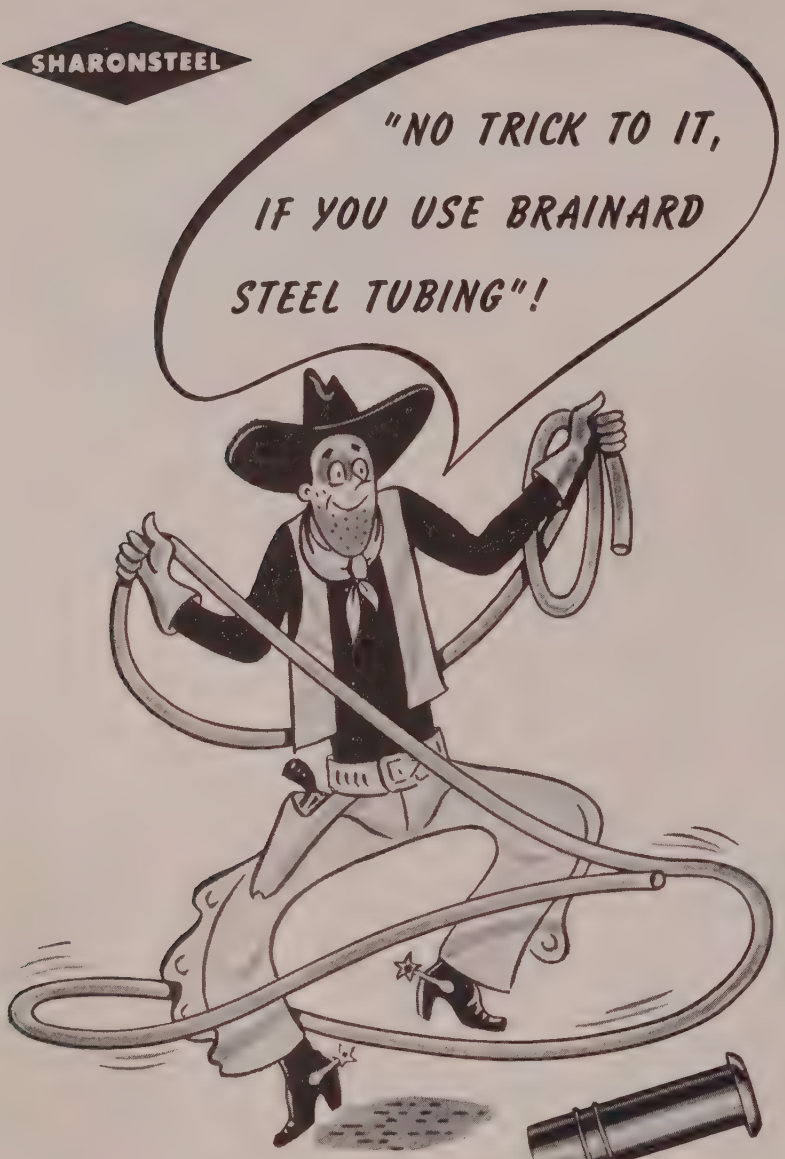
SHARONSTEEL

"NO TRICK TO IT, IF YOU USE BRAINARD STEEL TUBING"!



That's right, Pard! There's no trick to using Brainard welded mechanical steel tubing, because Brainard tubing is quality controlled from ore to product, assuring greater value at standard prices.

The superior forming characteristics of Brainard tubing eliminate much of the scrap that is common when "tricky" or difficult fabrication is encountered, because Brainard tubing is ductile, uniform, easier working.

New Brainard Tubing Catalog just off the press. Write today for your copy.

TUBING DIVISION

BRAINARD STEEL COMPANY

3311 LARCHMONT AVENUE WARREN, OHIO

There are Brainard sales offices in Atlanta, New York, Cincinnati, Pittsburgh, Buffalo, Rochester, N. Y., Chicago, Philadelphia, Detroit, Cleveland, Indianapolis, and Nashua, N. H.

Sales Representatives: Sharonsteel Products Co. in Detroit, Grand Rapids, Mich.; and Farrell, Pa. Fred J. Reynolds, Davenport, Ia.; Brass & Copper Sales Co., St. Louis, Mo.

Giant Weldments Completed

SEVERAL massive weldments for a large new hydraulic press—to be used for enlarging their existing facilities for structural and plate fabrication—have just been completed at the facilities of Ingalls Iron Works Co., Birmingham.

Frames for this large press, with integral hydraulic cylinders, are of box-section with a body width of 20 inches and a width of over-support brackets of 3 feet 6 inches. Overall height of frames and housings is 19 feet 8 inches with an overall width of 14 feet 4 inches. The frame section is 4 inches thick and 20 inches wide with a web plate of 2 inches.

Cylinders with a wall thickness of 4 inches and pistons were pressed in semicircular sections and later welded into complete units. Completed cylinders are 5 feet 8 inches long and were hot pressed to 32 inches outside diameter. The cylinder head is of 6-inch plate. The pistons are also rolled, formed hot to 17 inches outside diameter. They consist of 3½-inch plate, 5 feet 9 inches long. Piston weldments weigh approximately 6000 pounds each, and a completed half section of the press weldment, including cylinder, weighs 29 tons.

Upper and lower platens for the huge press are essentially duplicates, except for slight functional differences. Each platen weighs approximately 25 tons, is 32 feet in length and 8 feet high. They are of box-section and made with 2-inch web plate and 1½-inch stiffener. Heaviest section used is the platen face—8 x 18-inch steel, finished to 7 x 16 inches. Other sections are of 6 x 16 inch plate. All weldments were stress-relieved before they underwent any machining.

Computation Laboratory Set Up

These multisyllable words describe the National Bureau of Standards Computation Laboratory only recently completed. Functions of the laboratory are quite broad. In addition to performing computations requested by Federal agencies, universities and private industries, the laboratory works continuously to create a stockpile of mathematical tables which can be used to facilitate such computations.

At the same time, an effort is made to develop new or improved techniques for numerical computation, particularly those adaptable to automatic computing machines and to train mathematicians, both with the laboratory and in other parts of the bureau, in application of numerical methods to their work.

Calendar of Meetings—1951

JANUARY

Jan. 10-12, 1951, Southern Supply & Machinery Distributors' Association: Mid-year meeting Edgewater Gulf Hotel, Biloxi, Miss. Association address: 208 Peachtree arcade,

Jan. 14-16, Institute of Scrap Iron and Steel: Annual convention and exhibit of equipment manufacturers and suppliers, Hotel Commodore, New York. Institute address: 1346 Connecticut Ave., N. W., Washington 6, D. C.

Jan. 15-16, Industrial Furnace Manufacturers Association: Mid-year meeting, Edgewater Beach Hotel, Chicago. Association address: 420 Lexington Ave., New York 17.

Jan. 15-18, Plant Maintenance Show and Conference: Cleveland Public Auditorium. Clapp & Poliak Inc., 341 Madison Ave., New York 17, is managing the event.

Jan. 17, American Institute of Mining and Metallurgical Engineers: Western section open hearth committee, Iron and Steel Division, Los Angeles. Institute address: 29 W. 39th St., New York 18.

Jan. 18-20, Society of Plastics Engineers: Annual national technical conference, Hotel Statler, New York. Society address: 160 Coit St., Irvington, N. J.

Jan. 21-23, Truck-Trailer Manufacturers Association; Annual convention, Edgewater Gulf Hotel, Edgewater Park, Miss. Association address: 809 National Press Bldg., Washington 4, D. C.

Jan. 22-26, American Institute of Electrical Engineers: Winter general meeting, Hotel Statler, New York, Institute address: 33 W. 39th St., New York 18.

Jan. 22-26, American Society of Heating and Ventilating Engineers: 57th annual meeting and exposition, Commercial Museum, Philadelphia. Society address: 51 Madison Ave., New York 10. Exposition managed by International Exposition Co., 480 Lexington Ave., New York.

Jan. 25-26, Steel Plate Fabricators Association: Meeting, Palmer House, Chicago. Society address: 37 W. Van Buren St., Chicago 5.

Jan. 28-Feb. 1, Associated Equipment Distributors: 32nd annual meeting, Stevens Hotel, Chicago. AED address: 360 N. Michigan Ave., Chicago 1.

FEBRUARY

Feb. 1-2, Society for Advancement of Management: Annual spring management conference. Sponsored jointly with Northwestern University centennial committee. Chicago chapter, SAM, address: 53 W. Jackson Blvd., Chicago 4.

Feb. 8, American Coke & Coal Chemicals Institute: Regional meeting, Congress Hotel, Chicago. Institute address: 711 14th St. N.W., Washington 5, D. C.

Feb. 9, National Welding Supply Association: Western zone meeting, Hotel St. Francis, San Francisco. Association address: 505 Arch St., Philadelphia 6.

Feb. 14, Steel Kitchen Cabinet Institute: Annual meeting, place to be determined. Institute address: Engineers Bldg., Cleveland 14.

Feb. 16, Eastern States Blast Furnace Association: Meeting, William Penn Hotel, Pittsburgh.

Feb. 16-23, Automotive Electric Association: Meeting, Edgewater Beach Hotel, Chicago. Association address: 802 Michigan Bldg., Detroit 26.

MARCH

Mar. 5-9, American Society for Testing Materials: Spring meeting and committee week, Cincinnati. Society address: 1916 Race St., Philadelphia 3.

Mar. 6-9, American Road Builders Association: Meeting, Cincinnati. Association address: 1319 F. St., Washington 4, D. C.

Mar. 12-15, National Electrical Manufacturers Association: Meeting, Edgewater Beach Hotel, Chicago. Association address: 155 E. 44th St., New York 17.

Mar. 13-16, National Association of Corrosion Engineers: Conference and exhibition, Statler Hotel, New York. Conference committee address: P. O. Box 6120, Philadelphia 15.

Mar. 15-17, American Society of Tool Engineers: Annual meeting, Hotel New Yorker, New York. Society address: 1666 Penobscot Bldg., Detroit 26.

Mar. 18-23, Pressed Metal Institute: Spring meeting and technical session, Hotel Carter, Cleveland. Institute address: 13210 Shaker Square, Cleveland 20.

Mar. 19-23, American Society for Metals: Seventh Western metal exposition and Congress, Auditorium and exposition hall, Oakland, Calif. Exposition address: 215 S. Clark Dr., Beverly Hills, Calif.

Mar. 19-21, Steel Founders' Society of America: Annual meeting, Edgewater Beach Hotel, Chicago. Society address: 920 Midland Bldg., Cleveland 15.

APRIL

Apr. 5, National Metal Trades Association: Annual meeting, Sheraton-Biltmore Hotel, Providence, R. I. Association address: 122 S. Michigan Ave., Chicago 3.

Apr. 8-12, American Hardware Manufacturers Association: Spring convention, to be held jointly with Southern Wholesale Hardware Association, Palm Beach Biltmore Hotel, Palm Beach, Fla. AHMA address: 342 Madison Ave., New York 17.

Apr. 15-18, Scientific Apparatus Makers Association: Annual meeting of all sections, the Greenbrier, White Sulphur Springs, W. Va. Association address: 20 N. Wacker Dr., Chicago 6.

Apr. 16, Packaging Machinery Manufacturers Institute: Semiannual meeting, Hotel Dennis, Atlantic City, N. J. Institute address: 342 Madison Ave., New York 17.

Apr. 16-18, American Society of Lubrication Engineers: National convention, Bellevue-Stratford Hotel, Philadelphia. Society address: 343 S. Dearborn St., Chicago 4.

Apr. 16-21, Concrete Reinforcing Steel Institute: Annual meeting, the Homestead, Hot Springs, Va. Institute address: 38 S. Dearborn St., Chicago 3.

Apr. 19-20, American Machine Tool Distributors Association: Meeting, Edgewater Beach Hotel, Chicago. Association address: 1900 Arch St., Philadelphia 3, Pa.

Apr. 23-25, Industrial Diamond Association of America: Annual convention, with exhibit a possibility, Hotel Claridge, Atlantic City, N. J. Association address: 124 E. 40th St., New York 16.

Apr. 23-26, American Foundrymen's Society: Annual convention, Buffalo, N. Y. Society address: 616 S. Michigan Ave., Chicago 5.

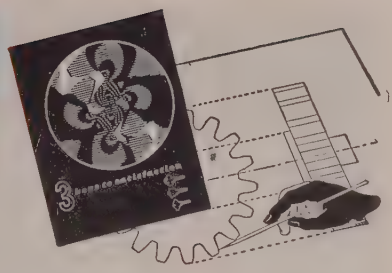
Apr. 25-26, Metal Powder Association: Annual metal powder show, Hotel Cleveland, Cleveland. Association address: 420 Lexington Ave., New York 17.

Apr. 30-May 1, Association of Iron and Steel Engineers: Spring meeting, Hotel Statler, Buffalo, N. Y. Association address: 1010 Empire Bldg., Pittsburgh 22.

Apr. 30.-May 4, Material Handling Institute: Fourth national materials handling exposition, International Amphitheatre, Chicago. Institute address: 1108 Clark Bldg., Pittsburgh 22.

MAY

May 3-4, American Steel Warehouse Association: Meeting, Drake Hotel, Chicago. Association address: 442 Terminal Tower, Cleveland 13.



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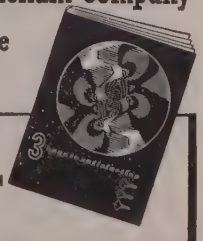

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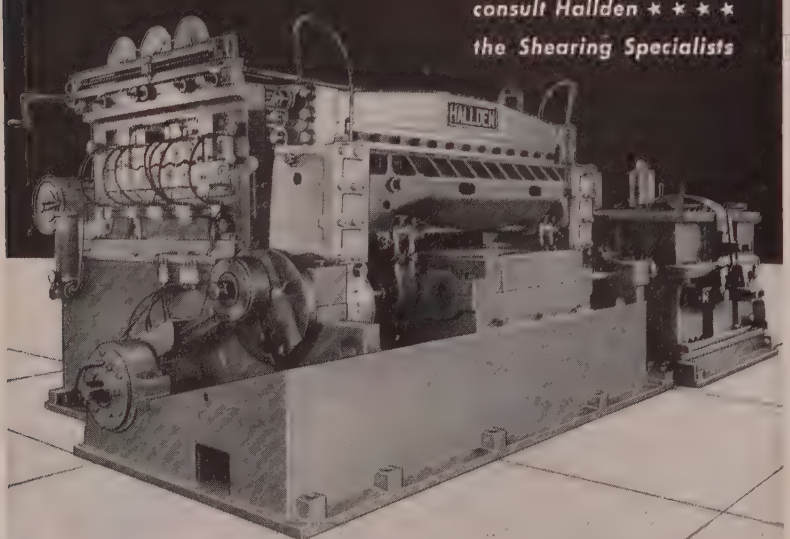

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CALENDAR
OF MEETINGS

May 3-4, Industrial Fasteners Institute: Annual meeting, the Homestead, Hot Springs, Va. Institute address: 3648 Euclid Ave., Cleveland 15, O.

May 6-9, Copper & Brass Research Association: Annual meeting of members, the Homestead, Hot Springs, Va., Association address: 420 Lexington Ave., New York 17.

May 7-9, National Welding Supply Association: Annual convention, Hotel Statler, Cleveland. Association address: 505 Arch St., Philadelphia 6.

May 14-16, Industrial Furnace Manufacturers Association: Meeting, the Homestead, Hot Springs, Va. Association address: 420 Lexington Ave., New York 17.

May 14-17, American Mining Congress: Coal convention and exposition, Public Auditorium, Cleveland. Congress address: Ring Bldg., Washington 6, D. C.

May 17-18, Lead Industries Association: Meeting for members and guests only, Biltmore Hotel, New York. Association address 420 Lexington Ave., New York 17.

May 21-22, American Zinc Institute: Meeting, Hotel Statler, St. Louis. Institute address: 60 E. 42nd St., New York 17.

May 23-24, American Iron and Steel Institute: Meeting, Waldorf-Astoria Hotel, New York. Institute address: 350 Fifth Ave., New York 1.

May 23-24, American Society for Quality Control: Annual convention, Hotel Cleveland, Cleveland. Society address: 22 E. 40th St., New York 16.

May 24, Rail Steel Bar Association: Meeting, Edgewater Beach Hotel, Chicago. Association address: 38 S. Dearborn St., Chicago 3.

May 24-25, Anti-Friction Bearing Manufacturers Association: Meeting, Edgewater Beach Hotel, Chicago. Association address: 60 E. 42nd St., New York 17.

May 28-30, Grinding Wheel Institute: Meeting, the Homestead, Hot Springs, Va. Institute address: Greendale, Mass.

May 28-30, Metal Treating Institute: Meeting, Hotel Colorado, Glenwood Springs, Colo. Institute address: 420 Lexington Ave., New York 17.

JUNE

June 4-6, American Gear Manufacturers Association: Annual meeting, the Homestead, Hot Springs, Va. Association address: 302 Empire Bldg., Pittsburgh 22.

June 10-13, June 13-16, National Metal Trades Association: Annual plant management conferences for Western members, Dell View Hotel, Lake Delton, Wis. (See also June 17-20. Association address: 122 S. Michigan Ave., Chicago 3.

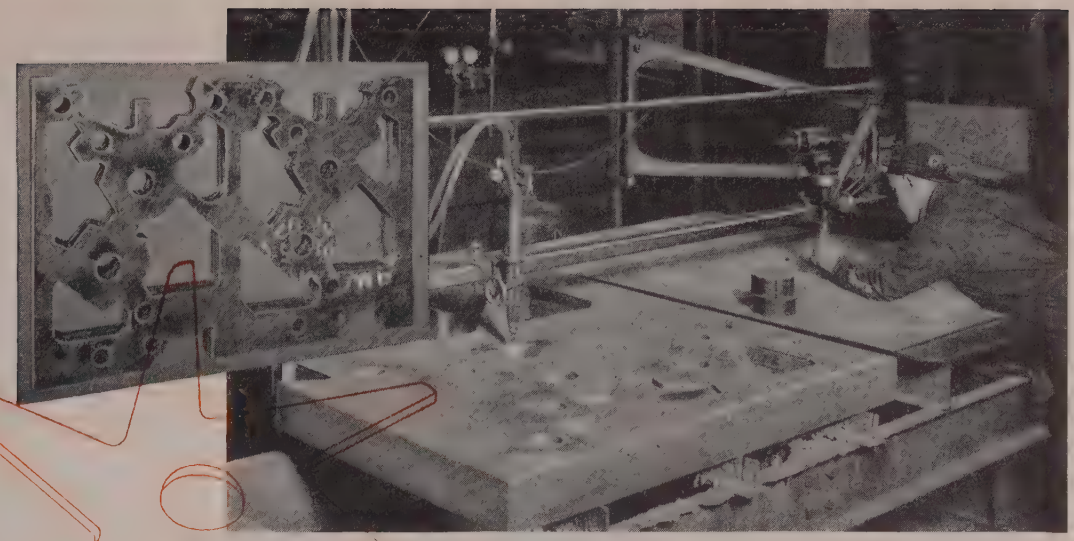
June 11-13, American Supply & Machinery Manufacturers' Association: Triple industrial supply convention, San Francisco. Association address: 1346 Connecticut Ave. N. W., Washington 6, D. C.

June 17-20, National Metal Trades Association: Annual plant management conference for Eastern members, Mayflower Hotel, Plymouth, Mass. (See also June 10-13, June 13-16) Association address: 122 S. Michigan Ave., Chicago 3.

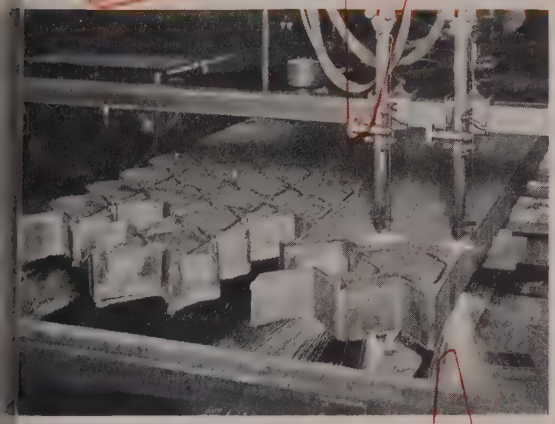
June 18-22, American Society for Testing Materials: Annual meeting, Atlantic City, N. J. Society address: 1916 Race St., Philadelphia 3.

June 21-22, Malleable Founders' Society: Meeting, the Homestead, Hot Springs, Va. Society address: 1800 Union Commerce Bldg., Cleveland 14.

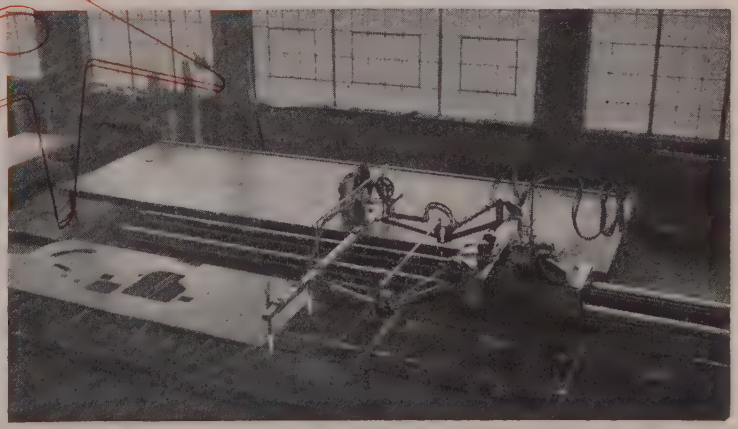
June 24-26, Alloy Casting Institute: Meeting, the Homestead, Hot Springs, Va. Institute address: 32 Third Ave., Mineola, N. Y.



MINIMIZES SCRAP LOSS· . . a nationally known steel fabricator uses an Airco *Oxygraph* for cutting printing press side frames where specified tolerances must be held to an unusually high degree. This permits the most economical utilization of steel with minimum scrap loss, and the machine's extreme accuracy effects considerable savings in machining time and cost; and often makes finish-machining unnecessary.



REDUCES PRODUCTION TIME· . . a huge steel mill speeds metal cutting with an Airco *Travograph*. Plates, slabs and billets are shaped—cut to dimensions, squared and beveled for subsequent fabrication—at an almost unbelievable reduction in production time. Heavy or light sections, regular shapes or intricate contours are all cut with equal facility.



CUTS STEEL WASTE· . . another steel fabricator uses the *Travograph* to cut out sides for large bottle washing machines. They found this machine able to cut these wide sections without moving the work — and because of the accuracy of the cut, steel waste is reduced to a minimum.

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CALENDAR
OF MEETINGS

June 25-29, American Institute of Electrical Engineers: Summer general meeting, Royal York Hotel, Toronto, Ontario. Institute address: 33 W. 39th St., New York 18.

SEPTEMBER

Sept. 2-7, American Chemical Society: Annual meeting, New York. Society address: 60 E. 42nd St., New York 17.

Sept. 8-9 (and Sept 14-16, if necessary), International Union of Pure and Applied Chemistry: Meeting, Washington, D. C.

Sept. 10-13, International Congress of Pure and Applied Chemistry: Meeting, New York.

Sept. 10-14, Instrument Society of America: National instrument conference and exhibit, Sam Houston Coliseum, Houston, Tex. Society address: 921 Ridge Ave., Pittsburgh 12.

Sept. 24-25, Steel Founders' Society of America: Fall meeting, the Homestead, Hot Springs, Va. Society address: 920 Midland Bldg., Cleveland 15.

Sept. 26-28, National Metal Trades Association: Annual convention, Palmer House, Chicago. Association address: 122 S. Michigan Ave., Chicago 3.

Sept. 27-Oct. 1, Multiple V-Belt Drive and Mechanical Power Transmission Association: Annual meeting, the Broadmoor, Colorado Springs, Colo. Association address: 7 W. Madison St., Chicago 2.

OCTOBER

Oct. 1-4, Association of Iron and Steel Engineers: Annual meeting, Hotel Sherman, Chicago. Association address: 1010 Empire Bldg., Pittsburgh 22.

Oct. 2-6, American Gas Association-Gas Appliance Manufacturers Association: Annual convention, Atlantic City, N. J. AGA address: 420 Lexington Ave., New York 17. GAMA address: 60 E. 42nd St., New York 17.

Oct. 5, Liquefied Petroleum Gas Association: Joint meeting, north eastern and southeastern districts, Atlantic City, N. J. Association address: 11 S. La Salle St., Chicago 3.

Oct. 8-13, Concrete Reinforcing Steel Institute: semiannual meeting, Grove Park Inn, Asheville, N. Car. Institute address: 38 S. Dearborn St., Chicago 3.

Oct. 10-12, Porcelain Enamel Institute: Annual forum, Deshler-Wallick Hotel, Columbus, O. Institute address: 1010 Vermont Ave., Washington 5, D. C.

Oct. 15-19, American Society for Metals: National metal congress and exposition, State Fairgrounds, Detroit. Society address: 7301 Euclid Ave., Cleveland 3.

Oct. 16-19, Scientific Apparatus Makers Association: Midyear meeting, recorder-controller section, Seaview Country Club, Absecon, N. J. Association address: 20 N. Wacker Dr., Chicago 6.

Oct. 18-20, Anti-friction Bearing Manufacturers Association: Meeting, The Homestead, Hot Springs, Va. Association address: 60 E. 42nd St., New York 17.

Oct. 22-24, American Mining Congress, Metal mining convention, Biltmore Hotel, Los Angeles Congress address: Ring Bldg., Washington 6, D. C.

Oct. 22-24, Packaging Institute: Meeting, Hotel Commodore, New York. Institute address: 342 Madison Ave., New York 17.

Oct. 28-30, Conveyor Equipment Manufacturers Association: Meeting, the Homestead, Hot Springs, Va. Association address, 1130 Vermont Ave. N.W., Washington 5, D. C.

Oct. 29-31, American Gear Manufacturers Association: Semiannual meeting, Edg

CALENDAR OF MEETINGS

...ter Beach Hotel, Chicago. Association ...dress: 302 Empire Bldg., Pittsburgh 22.

...29-31, National Lubricating Grease In...tute: Meeting, Edgewater Beach Hotel, ...icago. Institute address: 4638 J. C. ...chols Parkway, Kansas City 2, Mo.

...31-Nov. 2, Foundry Equipment Manu...cturers Association: Meeting, the Home...ead, Hot Springs, Va. Association ad...ess: Engineers Bldg., Cleveland 14.

NOVEMBER

...7-9, Annual Meehanite Research Meet...g: Hotel New Yorker, New York. Spon...r's address: Meehanite Metal Corp., ...ershing Bldg., New Rochelle, N. Y.

...12-15, National Electrical Manufactur...s Association: Meeting, Haddon Hall, At...ntic City, N. J. Association address: ...5 E. 44th St., New York 17.

...28-30, Scientific Apparatus Makers As...ciation: Midyear meeting of industrial ...strument, laboratory apparatus, labor...ory equipment, optical, aeronautical and ...litary instrument sections, Hotel New ...orker, New York. Association address: 20 ... Wacker Dr., Chicago 6.

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Under the hood of your car you'll find this unusual looking Ⓑ special. It does a better job of latching your car-hood than other fastening devices. Simplified design through specialized fastening is today's trend.

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SPECIFICATIONS

Steel, 1015, finish cadmium or zinc plate. Heads to be concentric with barrel to within .015. P.D. of thread to be .4639 —.4675, after plating. Dimensions to suit your most exacting requirements. Quality—Ⓑ.

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9500 cuts on ¼" alloy valve stock; cutting 2" x 1¾" risers on nickel-iron castings in 16 seconds; showed no binding or breakage on 5½" x 2½" heavy, stainless, alloy steel castings which are normally burned; outlived and outperformed competitive wheels on 15/32" carbon steel, drill bit rod; and gave 46.6% longer service than the average of competitive wheels on stainless, low carbon, beryllium copper, silicon bronze and manganese bronze 1" stock.

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Steel Ready—Peace or Wa

High output and far-reachin expansion give assurance industrial strength

By WALTER S. TOWER
President
American Iron & Steel Institute

THE RECORD in steel is profoun ly significant and assuring. This i dustry, which can outproduce all t rest of the world combined, is enc mously stronger than a few yea ago, and is making giant strides increase its size.

A few simple facts tell the sto The steelmaking furnaces in t United States poured nearly 97 m lion tons of steel during 1950 agair the background of intense dema or about 7½ million tons more th in any previous year. The record hi output of 1950 was only 12 days' o put short of 100 million tons. In ea of several weeks at the peak of t year's activity, production was at annual rate exceeding 103 milli tons.

Demand Tops Supply—Still, t output of certain types of steel w below the abnormally high dema which derived in part from so-call "scare buying."

No other country can even proach the United States in steel p duction. In three months our f naces have been making more st than can be made in a year in a other country. In one month, th furnaces can exceed the annual p duction of every other nation exc Russia, Great Britain, Germany a France.

Liberty's Bulwark—Thus the st industry in the United States is stout bulwark helping to protect l man liberty and enlightenment. A its strength is being increased ste ily. At the end of 1952, steel co panies' present plans will ena them to produce 22 per cent m steel annually than was made in peak year of World War II wh the United States was sending st all over the world.

In fact, so many new expans moves are being planned in steel t the end of their possibilities can be foreseen.

Steel companies already are bet equipped than ever before. T have invested nearly $2.4 billion d lars on plants and equipment sin the end of World War II, or sligh more than their aggregate net come for the period. They have combined annual capacity of m than 100 million tons, as of July

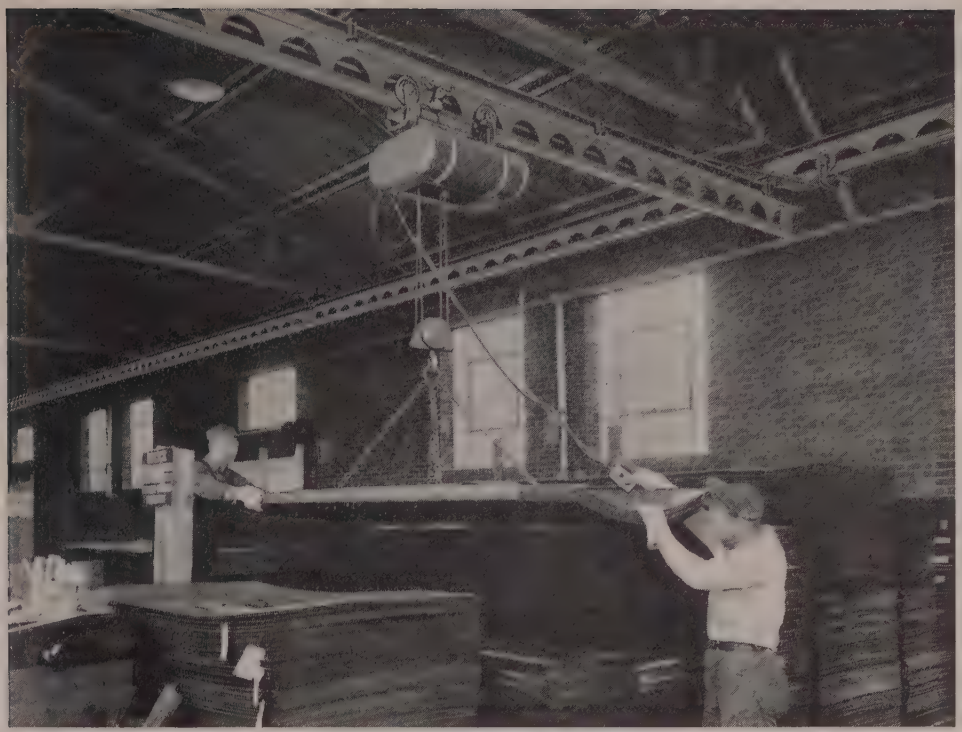


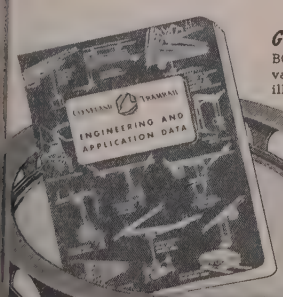
Photo T-4938 Handling one-ton packs of 26-gauge silicon steel sheets size 34" x 121" with inexpensive handpropelled Cleveland Tramrail crane and electric hoist.

TRAMRAIL System Cuts Sheet Steel Handling Time 37½%

STUDIES by Sangamo Electric Company, Springfield, Illinois, makers of precision electrical measurement instruments, revealed that even though their finished products are light in weight, materials handling amounts to a substantial percentage of the total factory payroll. Well over ⅓ of their handling costs is for raw material handling.

With a postwar production rate double that of prewar, it has been necessary for Sangamo to improve methods and purchase equipment to move greatly increased volumes of materials with a minimum addition of building and labor. A Cleveland Tramrail system for handling steel sheets in their receiving department, was one of the two most outstanding additions in this program made during 1948.

The Cleveland Tramrail system has reduced worker fatigue and accidents and has directly resulted in the saving of 12 manhours for every 70,000 lb. car of sheet steel unloaded. Whereas this job formerly required 32 manhours, it is now done in 20—a 37.5% reduction in time.



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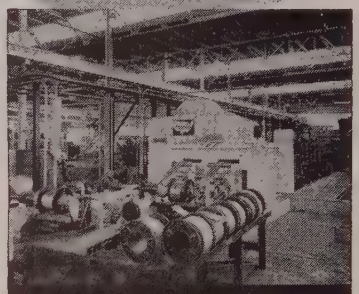
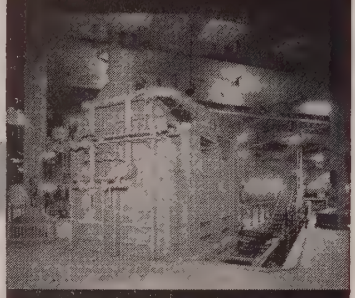


Continental Automatic Strip Production Line consisting of annealer, pickling machine, dryer, and coiler.



Continental Special Automatic Pig Molding Machine complete with automatic charging, melting, and pouring.

Continental Automatic Production Line operating from raw materials to completely finished and packed product. This production line consists of fifteen integrated, synchronized, special automatic machines.

Continental Special Automatic Glazing Machine complete with automatic press synchronizer and fire polisher.

Manual operations have to be eliminated to really roll back costs. With CONTINENTAL Special Automatic Machines and Integrated Production Lines the labor savings alone reduce costs to a fraction. Besides a better and more uniform product, production is continuous, and waste and scrap are negligible.

CONTINENTAL'S over-all job delivers to you the complete, unitized special machine or production line installed and producing, with results guaranteed.

With over 25 years' experience extending into practically every industry, our continuous research produces many original designs and improved procedures. All of this data is available for preliminary planning. You are invited to share CONTINENTAL'S engineering "round table" to discuss any special automatic machine or production line you have in prospect. There is no obligation.

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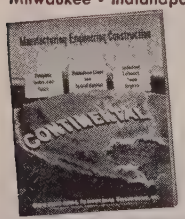

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SPECIAL MACHINES
COMPLETE PLANTS

MANUFACTURERS—ENGINEERS—CONTRACTORS FOR OVER A QUARTER OF A CENTURY

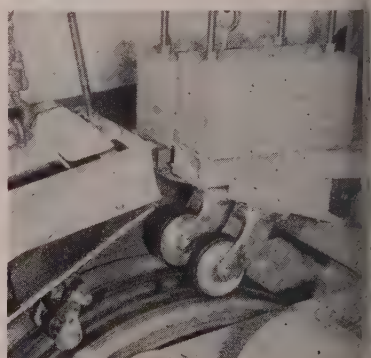
1950. They plan to add about 1 million tons of capacity. That wi mean at least 110 million tons' ca pacity by the end of 1952. And, po sibly, even a larger capacity may b available at that time.

Plenty for War—The fact is tha whether another world war at son early or later date decides the fu ture fate of mankind, the Unite States can make all the steel neede for its military requirements and hav a very generous amount left over fo essential civilian uses. The vast ou put of steel in 1950 alone was fa above the amount produced in th biggest year of World War II.

In a war economy, however, the are considerations other than ste capacity which may restrict the us of steel for civilian goods, such diversions of manpower from man facturing plants, scarcities of oth metals and nonmetals, controls credit, priorities on transportatio facilities, or even overwhelming wa requirements for certain items no heavily produced in peacetime. Thu despite increasing steel capacity, go ernment policies may closely restri the output of civilian products spite of the desires of millions consumers.

Civilian Deficit Eliminated — Fo tunately, the civilian economy is be

Hub of Wheel Researcl



Test equipment designed to perm a wide variety of tests on industri wheels and casters up to 20 inches diameter is enabling the laborato of Aerol Co. Inc., Burbank, Calif., resolve design problems posed by r quirements of American industry. Loa up to 2500 pounds may be applied speeds variable from 1.5 to 25 mp Apparatus consists of a large drum r volving at variable speeds beneath superstructure for testing three articl at one time. Realistic shock loads ca applied during tests to simulate rou surface conditions.

t equipped now than ever before. st of the record 1950 production steel has been used principally to rease the ownership of homes, au- nobiles, household appliances and er items to the highest point ever ained and to help support an un- ecedentedly high level of national ployment. Since 1946, the steel mpanies have made the steel to ild over 25 million new autos and cks, 19 million new refrigerators, 5 million new homes, 54,000 miles of pelines and countless other items record-making volume.

Earnings Finance Growth—The net rnings of the steel companies con- nue to serve as a major source of nds for the huge expansion pro- ams now in progress at ever ounting costs. It is important that e industry be continued on a profit- le basis. Although the companies' rnings were substantially higher in e first three quarters of 1950 than the somewhat reduced level of 949, inflation has taken a sharp toll the profit dollars in terms of their lative purchasing power. Sharp in- reases have occurred in the cost of verything bought by steel com- anies. Their total payroll exceeded 2.3 billion in 1950, compared with little over $2 billion in 1949. Em- loyment rose from 602,000 at the nd of 1949 to around 650,000 in the tter part of the year. The aver- ge hourly payments to wage earners veraged $1.72 through most of the ear, to which an increase was added n December.

Armament requirements for steel ave been small to the present time nd detailed information for the fu- ure is lacking. But regardless of what happens, steel companies can be elied upon to do more than their hare toward maintaining and in- reasing the industrial strength of he United States. The record in teel is clear and assuring.

Versatile Sheet Shear Unveiled

Imagine wielding a knife in at- empting to cut a moving band of trip steel travelling at various speeds p to 200 feet per minute with such precision that each piece is within ne-eighth inch of the same specified length. This is the problem in to- day's mills producing galvanized sheet for roofs. The old way had been to use a continuously rotating cutter so geared as to make one cut each revo- lution. But this was an expensive device, and involved a gear change each time some different length of cut was desired.

Now an electronically controlled cutter developed by Westinghouse

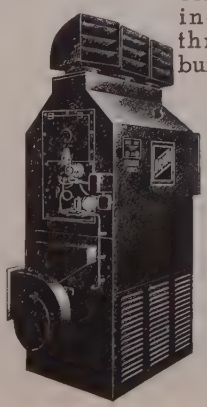
DRAVO *Counterflo* HEATERS

When you start to clear a foundry of smoke, noxious fumes and dust, it's not enough to push the foul air *OUT*. To complete the ventilating job, you must bring fresh air IN!

Natural air infiltration through doors and windows is usually not sufficient to replace exhausted foul air. Mechanical induction of sufficient make-up air takes care of this problem, but generally introduces another. During colder months, this replacement air must be heated, or working areas will be chilled far below comfort levels and production will suffer.

As many foundries have discovered, there's a sound, proven answer ready and waiting: just apply "artificial respiration" with Dravo *Counterflo* Heaters. When cold weather sets in, the heating function goes into instant action, tempering the make-up air to maintain comfortable working conditions throughout the building . . . and, incidentally, overcoming negative pressure and thus increasing the efficiency of all combustion equipment. All through the warm months, the ventilating function provides a continuous supply of unwarmed fresh air to replace foul air.

There are many reasons why foundries make Dravo Heaters first-choice for this responsible job. The range of capacities—from 400,000 to 2,000,000 Btu per hour—provides the proper unit for every load and provides air handling capacity of 11,000 cfm per million Btu output. The heaters can be mounted in any position, and so accommodate themselves to space restrictions. Ready interchange between oil and gas is also a feature. The 80-85% efficiency spells operating economy, and the top-flight engineering, rugged mill-type construction incorporating a stainless steel combustion chamber, minimizes maintenance. Dependable automatic controls make a full-time attendant unnecessary.



Perhaps YOU have a foundry ventilating problem that is affecting worker morale and efficiency—or perhaps you are spending MORE than necessary for heating by old-fashioned methods. For a quick picture of what Dravo Heaters are doing in solving such problems, ask for Bulletin JK-520-13

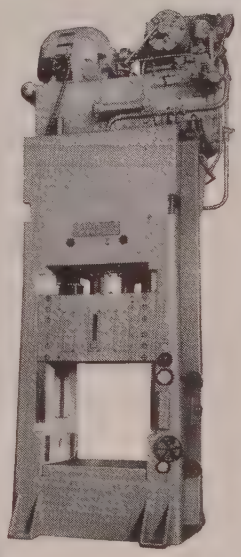
DRAVO CORPORATION

DRAVO BLDG., PITTSBURGH 22, PA.

Manufactured and sold in Canada by Marine Industries, Ltd. Sorel, Quebec

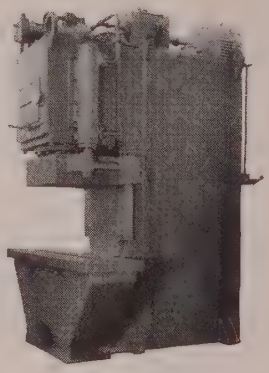
Export Associates:
Lynch, Wilde & Co. Washington 9, D. C.

A WILLIAMS - WHITE machine for every forming, punching, shearing, rolling or pressing operation . . . . . .

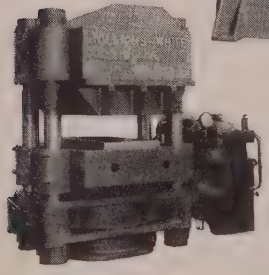


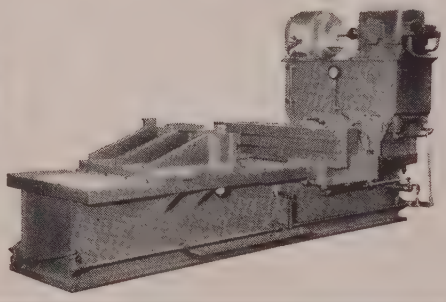
At right: 500-Ton Hydraulic Housing Press: Bed and ram area, 48 x 48 in.; Daylight opening, 54 in.; Stroke, 36 in.; Drawing speed, adjustable; Hydro - pneumatic die cushion.

Below: 500-Ton Hydraulic Gap Frame Press: Platen surface, 24 x 96 in.; Throat, 18 in.; Daylight opening, 30 In.; Stroke, 24 in.



Below: 600-Ton Column Moving Up Hydraulic Press: Platen surface, 42 x 60 in.; Daylight opening, 24 in.; Stroke, 12 in.





At right: 200-Ton Hydraulic Bulldozer, with adjustable end lug. Die space, 36, 48 and 60 in.; Stroke, 24 in. Foot button or treadle control.

THE hydraulic machines shown above are representative of the equipment built by WILLIAMS-WHITE & CO. It is famous all over the world for quality and long service.

When interested in machines similar to the ones illustrated, write us, giving as much information as possible and we will send complete specifications with no obligation on your part.

MAKERS OF PRECISION PRODUCTION MACHINERY FOR NEARLY 100 YEARS

WILLIAMS-WHITE & Co.

702 THIRD AVE., MOLINE, ILLINOIS

Electric Corp. does the job. A phototube is set on the far end of the table a certain exact distance short of the length of galvanized sheet desired. When the end of the sheet arrives, the phototube signals the cutter motor, which starts, makes the cut, and stops in precisely the original position waiting for the next cutting signal. This shear can be varied to make accurate cuts of different lengths and for different production speeds from 30 to 200 feet per minute.

Farm Equipment Demand Up

Demand for farm machinery of all types will probably reach a post-war high in 1951, predicts Horace D'Angelo, executive vice-president, Harry Ferguson Inc., Detroit.

Whether or not the farm equipment industry will be able to meet this demand will depend on the supplies of steel and other metals which will be available under the defense measures being instituted by the government, he said. Farm income will be high in 1951 and the expanding defense program will reduce the labor supply available for farms; Mr D'Angelo believes that this means that the farmer must depend on machines more heavily than ever before to do his work.

He has noted that the increasing domestic demand is paralleled by a growing demand for modern power farm machinery in other countries, a factor which increases the problem of adequate supply. An improvement in the exchange position of many countries and the introduction of expanding agricultural programs have increased the requirements for farm machinery throughout the world. He hopes that a serious scarcity of farm equipment will be avoided by intelligent planning and timely government action.

Pouring Speed Controlled

Accurate control of pouring speed in a centrifugal casting operation may be obtained through application of a regulator operating in a hydraulic circuit of 250 pounds maximum pressure. It is quickly set to pass any desired number of gallons per minute, regardless of pressure variations, within the limits of the device.

Since volume of flow determines the distance traveled by the hydraulic piston in a given time, the regulator made by W. A. Kates Co., Deerfield, Ill., provides an effective governor which closely controls speed of movement against any resistance no

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MADE WITH

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	Typical Composition
IRON FOUNDRY GRADE	Vanadium . . . 38-42% Silicon . . . . . 7-11% Carbon . . . . about 1%
GRADE "A" *(Open Hearth)*	Vanadium . . . 35-45% 50-55% Silicon . . . max. 7.50% Carbon . . max. 3.00%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% 50-55% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" *(Primos)*	Vanadium . . . 35-45% 50-55% 70-80% Silicon . . . max. 1.25% Carbon . . max. 0.20%

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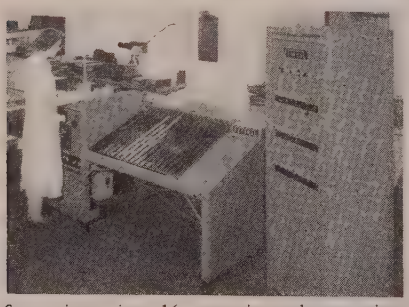
CHEMICALS AND META

Dimensional control freezes high-quality standards

Another of the many industries served by Federal Gages

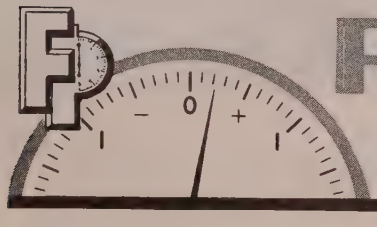
The thing that keeps a household electric refrigerator cold is its compressor — a small piston sliding smoothly in a close-fitting cylinder. The Westinghouse Electric Corporation makes every effort to obtain ultra-precise clearances in this mechanism.

That's why Westinghouse installed this Federal Electronic Sorting Gage. A group of four inspectors formerly did the work of this gage, but they were human. They occasionally made mistakes . . . like reading the size of a piston incorrectly, or putting the piece in the wrong size category. Now, with this one Federal Gage, all pistons and piston pins are gaged accurately and all come to rest in their correct size groups automatically. The gage cuts inspection costs, reduces rejects, and eliminates the possibility of improperly sized parts at Assembly. It helps Westinghouse to keep the production line rolling smoothly—to sell *high-quality* refrigerators.



Sorts pistons into 16 categories and two reject groups—piston pins into 10 categories and two reject groups. Handles same number of parts formerly gaged by four inspectors. Gage automatically stops when any size category is full. Tolerance per category: .0001"

Here is but one example of the more than 20,000 individual gage designs in the Federal engineering files — true testimony of the trust that people place in Federal Gages. This fund of practical gaging knowledge is available to you, too! If dimensional control is your problem, consult Federal *first*. It's the natural and economical thing to do. Federal Products Corporation, 127 Eddy Street, Providence 1, Rhode Island.



FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES.

greater than available pressure. Because the control is volumetric, it is said to function without reference to the independent factors of load or input pressure.

Gage Conserves Tin

A new electronic tester which will measure tin coatings on ferrous stock as thin as 1-millionth of an inch in approximately 30 seconds, was recently announced by the Research and Control Instruments Division of North American Philips Co. Inc., Mt. Vernon, N. Y. Developed in co-operation with one of the largest steel and tin plate producers, the tester permits quick, accurate, economical, nondestructive thickness gaging on one side of a sheet at a time or on both sides simultaneously.

Known as the Norelco Geiger counter tin plating thickness gage, the unit conserves critical tin by making possible the maintenance of continuous coatings of satisfactory characteristics.

It is said to permit close quality control more speedily and more accurately than conventional chemical methods and with considerable savings in time and in the cost of test acid.

The sheets being tested are not wasted as they may be used in the ultimate product. In this electronic apparatus, collimated x-radiation from a high-intensity x-ray tube is directed onto the plated test sheet. The emergent radiation is accurately measured by a Geiger-counter, which operates suitable electro-mechanical printed tape registers.

Thickness determination can be made at various positions along the sheet which may be up to 39 inches wide. Continuing process control is maintained to insure very close tolerance on thickness over any desired areas.

Carbon Potential Measured in Gas

It now is possible to regulate the surface carbon content of steel during heat treating, the carbon potential of the furnace atmosphere being expressed directly in terms of percent carbon. Using the Microcarb control developed by Leeds & Northrup Co., Philadelphia, heat treaters can adjust the atmosphere to increase or decrease the potential automatically as required for the work in the furnace, for surface carburizing, homogeneous carburizing, carbon restoration hardening and for annealing.

A Carbohm detecting element projects into the furnace chamber and electrically "senses" the carburizing

tial of the furnace atmosphere. ected to this element is a Micro- controller that automatically ad- the flow of carburizing fluid to carbon potential of furnace gas ny selected value between 0.15 .15 per cent carbon.

per Plating Speed Increased

Smoother, less-grainy, plated copper be laid down at a faster rate se of small doses of a new addi- agent in your electrolytic cyanide per plating baths. Called Wes-X, additive has just been announced Vestinghouse Electric Corp. velopment of the addition agent rticularly timely. Today's trend thicker layers of copper to pro- better corrosion protection. When

Standards—Your Business

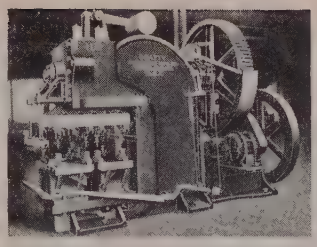
Although standards are im- ortant at any time, in this eriod of industrial prepared- ess they take on added signifi- ance. In an effort to explain self and its work to the heads f American industry, the merican Standards Associa- ion, New York, is issuing a amphlet titled "Standards Are our Business".

It emphasizes the value of tandards of nation-wide scope, ather than company or indus- ry standards and tells how hese national standards mean ollar savings to manufacturer nd consumer alike.

The 24-page pamphlet is vailable from the association, 70 East 45th St., New York 17, N. Y.

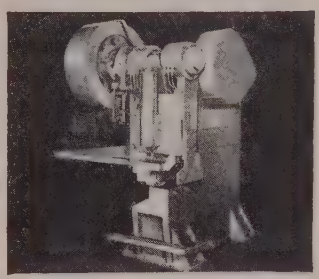
conventional cyanide electrolytes e used, thicker copper plate be- ie too rough, too grainy. Use of nide copper electrolyte seemed to decreasing, being replaced by the i-type electrolyte. With the new ition agent, however, heavy, both, and bright deposits of cop- are now produced in the cyanide ition.

Among addition agents it is unique tilizing an inorganic metallic salt a base instead of an organic one. chs are much more stable with s inorganic agent because no de- nposition products are built up cause low quality deposits such as se which occur with organic ents. The addition agent is appli- ble to both conventional and peri-



BEATTY No. 11-B Heavy Duty Punch widely used in railroad industry.

Beatty Horizontal Hydraulic Bulldozer for heavy forming, flanging, bending.



Beatty Single End Bar Shear available in capacities up to 300 ton.

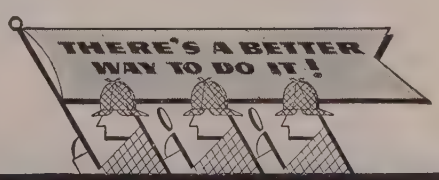
Beatty 250-ton Gap Type Press for forming, bending, flanging, pressing.

YOU NAME the problem

WE'LL BUILD the answer

If you have a heavy metal working problem, the odds are that a BEATTY engineer can provide the answer. That's true because BEATTY engineers have designed and built so many special machines that no problem is completely new to them.

Our experience in many fields qualifies us to design and build heavy metal working tools that will speed your production, reduce your fabricating costs. There is a better way to handle most production problems, and our specialty is to help you find that better way.



HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

SHENANGO-PENN *Centrifugal* CASTINGS ... KEY TO SAVINGS

Bronze end bushings, left, as well as large cast iron mandrels, above, (shown with bushings in place) were cast centrifugally and finish machined by Shenango-Penn, evidencing wide flexibility of Shenango-Penn centrifugal technique. Used in forming composition pipe, mandrels must withstand repetitive high pressures and stresses.

For high pressures, high stresses . . .

IF you need rolls, or *any* symmetrical or annular parts requiring unusual strength, uniformity, wear resistance or freedom from porosity and defects, check with Shenango-Penn. These very qualities are inherent in the carefully controlled Shenango-Penn *centrifugal* casting process. You stand to save time and money . . . to avoid needless trouble.

Check also on Shenango-Penn's modern machining and finishing service. It combines complete facilities and years of specialized experience to meet your specifications with over-all precision . . . another time-and-money saver!

For free descriptive bulletins, for specific data on ferrous or nonferrous work, large or small, semi or finish machined, write to . . .

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Executive Offices: Pittsburgh, Pa.

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MONEL METAL · NI-RESIST · MEEHANITE® METAL

odic reverse-current plating tech niques.

Westinghouse chemists have alse revealed a new development in the brass-plating field. By making a fundamental change in the electrolyt used, efficiency of the brass-platin process has been increased from abou 50 to 100 per cent. Brass plating i highly desirable for some decorativ purposes and absolutely essential a a coating for steel to which rubbe is to be applied, such as wire for tir casings.

Less Fabricated Copper in 1951

Fabricated copper will be in tigh supply in 1951, according to Whippl Jacobs, president, Phelps Dodge Co per Products Corp., New York. Wit wire and other copper products e sential in one form or another nearly every manufacturer in th United States, it is expected thu production will consume all availab raw materials.

Subject to the limitations of th supply of raw copper and under re strictions that may come from o ficial sources, fabricators of copp can look forward to a year of stead production and utilization of the mo ern plants put into operation sin the end of hostilities in Japan an Europe, Mr. Jacobs believes.

Coating Resists Corrosion

Both an active rust-inhibitor d to soluble chromates, and a weath resistant finish coat, due to its hi aluminum content, is a metal pr tective coating, a combination of al minum pigment with potassium-ba um chromate. Developed by Richmo Marine Compositions Co., Stat Island, N. Y., the coating may be us as a primer or finish coat.

Said to have a finished aluminu appearance, coating dries in abo 4 hours and is reported to be ru weather, oil and grease resistant. A plication may be by either spray g or brush.

Booklet Describes Lab Functio

Taking the reader on a pictu word tour of the new W. Keith M Afee Laboratory of Universal-Run Corp., New Castle, Pa., is a recen issued booklet. Issued to commem ate the new laboratory named in ho or of the company's late board cha man, the booklet pictorially cove many of the functions of the labor tory, as well as giving factual inf mation on the company and t plumbing products it manufactures

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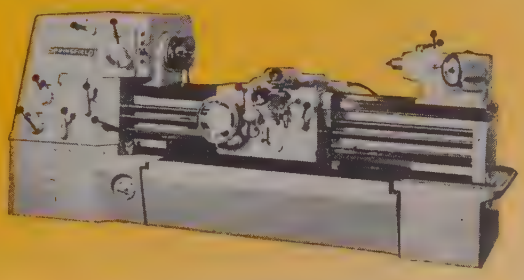
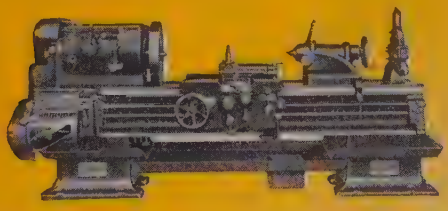
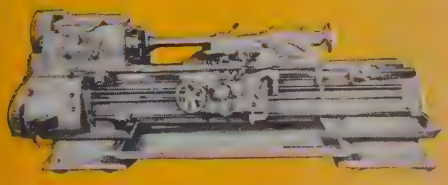
handle a wider range of work—

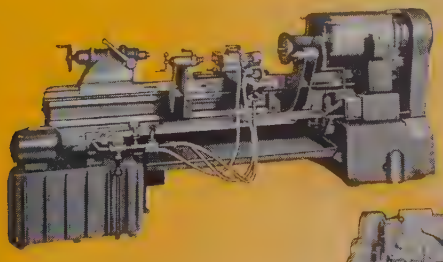
increase output—

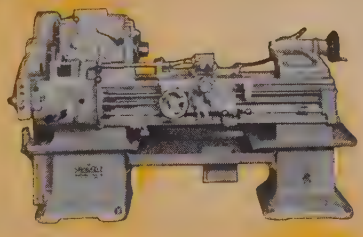
lower operating costs











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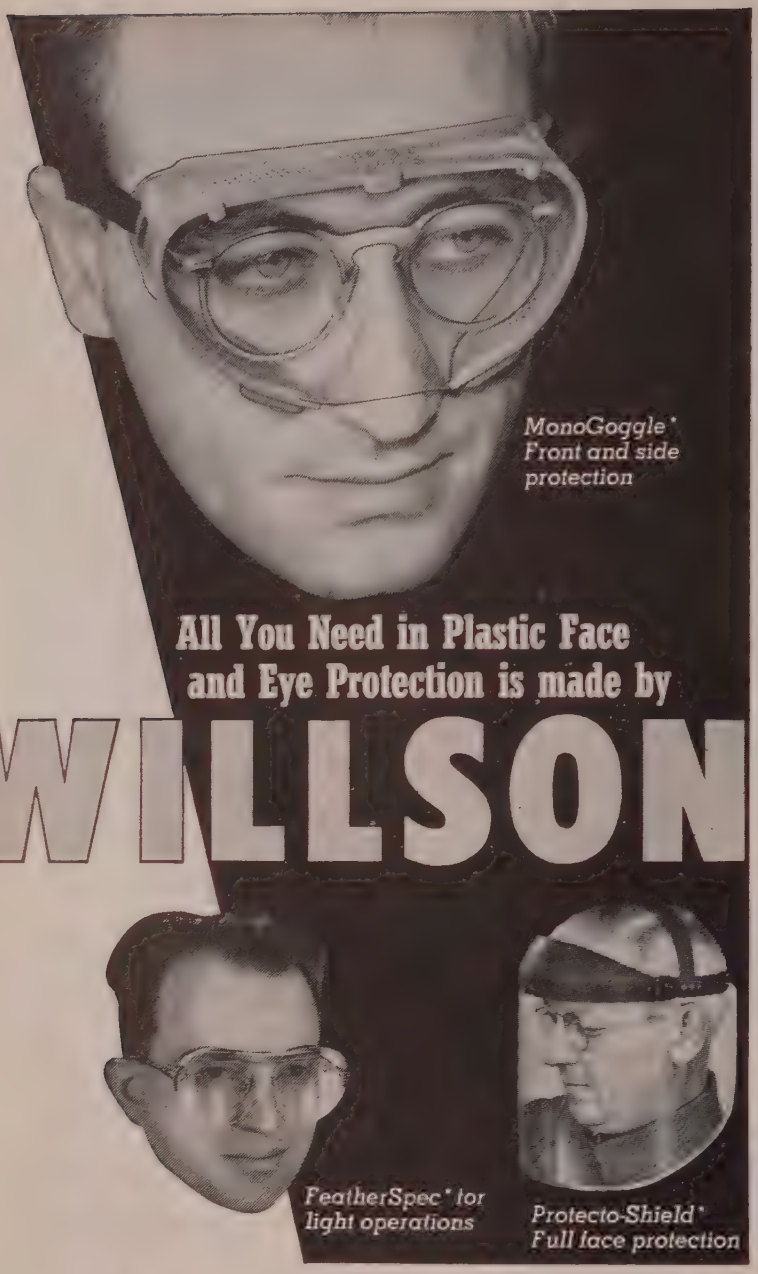

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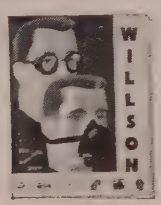
These three types of protective devices, all with one-piece plastic lenses or visors and each with many variations, give you a wide selection to meet specific requirements of work hazards. Their light weight and comfortable fit insure workers' willingness to wear them for long hours on the job. Complete information on plastic protection and other eye and respiratory safety equipment is available in the new WILLSON catalog. Get your copy from our nearest distributor or write direct to WILLSON PRODUCTS, INC., 233 Washington Street, Reading, Pa.



*T.M. Reg. U.S. Pat. Off.

Now--Harder Stainless

Working stainless steel at 300° below zero doubles its hardness during laboratory study

FOLLOW-UP of an unexpected result from routine tests, i.e., the presence of magnetism in a fractured piece of stainless steel, has led to a new process whereby this metal can be made some 100 per cent harder than has been possible by conventional metalworking procedures. This hardness increase, achieved by working at subzero temperatures (down to minus 300° F) makes stainless steel, never noted for its hardness, a more versatile metal.

Magnetic Effect Shown Near Fracture—During fundamental investigations of cast stainless steels at Crane Co. laboratories, impact tests were conducted at the temperature of liquid nitrogen (about −300° F). After the tests were completed, one of the samples, which had returned to room temperature, exhibited a strong magnetic effect near the fracture. Other samples broken at room temperature showed none of this magnetism. Subsequent tests showed that temperature alone was not a factor. Apparently the increase in permeability had been caused by a combination of the severe plastic deformation—caused by the impact tests—and the low temperature.

When steel is either heated or cooled certain changes in its crystal structure may take place. In cooling to subzero temperatures, stainless steel can be made to change from the gamma to the alpha state; this transformation brings about various changes in physical characteristics. Magnetic permeability is but one property affected.

Hardness Increases Two to Three Times—To research engineers this hinted that other improved properties could be expected by working the metal at low temperatures. Tests made with the broken impact samples confirmed this supposition. Adjacent to the fracture, hardness had increased over that in the "as-cast" condition by some two to three times.

This discovery was the basis for intensive co-operative studies by D. Ziegler and by P. H. Brace of Westinghouse Research Laboratories whose engineers explored the effects of rolling and drawing at subzero temperatures. Combination of preparatory heat treatment, subzero working, and subsequent high temperature aging was tried. Some of the best results were obtained by a short period of heat treatment at about 2100° F; quenching in water; cooling to

…t —300° F; rolling the metal …e at that temperature from ¼- … down to 1/16-inch; and then …g for several hours at 750° F. …esults were better than obtainable …low-temperature rolling alone, by …paratory heat treatment alone, or …any combination of these proc-…s.

…ignificantly, the highest hard-…s and strength values were ob-…ed in those specimens rolled at … lowest temperature. Tensile …ngth, yield stress and hardness …e all increased by this process …compared to conventional rolling. … particular interest was the in-…ase in proportional limit, which …ved to be more than double that …ained by rolling at room tempera-…e. Torsional yield stress and fa-…ue strength was also increased … about one half. The process is …g referred to as Zerolling.

…pecial Processing Shows Long …ar—One sample tested showed an …n more remarkable characteristic. …stenitic stainless steels worked by …ventional methods have a very low …ar resistance, as compared to the …t wear-resistant metals, such as …tain of the cobalt-chromium base …oys that are frequently used be-…se of their excellent resistance … wear under conditions of sliding …tion.

…One of the specially processed …inless steel specimens, differing …ghtly in composition from the …ers, showed a wear performance …al to or better than the best wear-…istant metal combinations. Al-…ugh this characteristic did not …ow up in other samples to as great …degree, the possibility exists that …se unusual results can be repro-…ced consistently.

…rain Gages Design Steam Chest

…Resistance wire strain gage meas-…ements taken on the walls, cover …d bolts of a fabricated steam chest …re, to a large extent, responsible … its design. The SR-4 gages, made … Baldwin Locomotive Works, Phila-…lphia, were bonded to interior and …terior walls at 14 points and to the …ter of the cover. Four additional …ges were bonded 90 degrees apart … each of two studs in the centerline … the long sides and cover, these to …ve axial strains and stresses.

…Strains were measured when pres-…re in the chest had been raised to …00 psi, double normal operating …essure. System was filled with …E-10 oil and a hand pump was …ed to produce the desired pressure. … 21-point transfer switch was used …th the strain indicator to speed … testing and calculating.

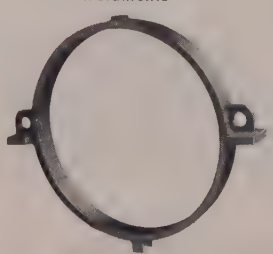
CLEVE-WELD

Bogie Bands for Tanks

CIRCULAR ROLLED AND WELDED STEEL PRODUCTS help keep them moving!

Stainless Steel Rings for Aircraft

Rings, bands and circular weldments



The Cleveland Welding Company is already producing circular rolled and welded steel products for aircraft, tank and other armament. Manufacturers naturally turn to Cleveland Welding when in need of hoops, rings and bands, as we are industry's mass production specialists in producing these parts. Each year, we manufacture millions of these items . . . saving manufacturers thousands of dollars on circular weldments. Modern mass production equipment and experts with years of experience frequently enable us to quote you *a lower price* than your own internal cost estimates. It will pay you to contact us about circular rolled and welded steel products for essential or peacetime needs. A new general catalog, just off the press, contains complete data on our facilities and products. Write for your copy today.

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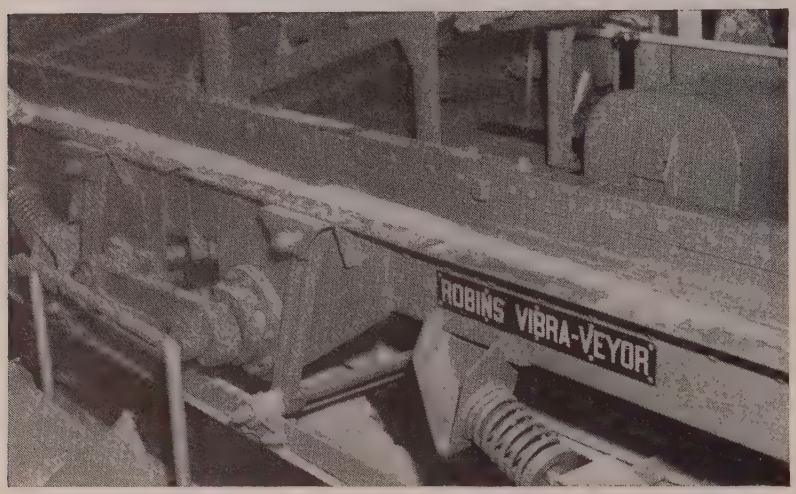


THE HEWITT-ROBINS VIBRA-VEYOR® . . .
Up to 200 Feet of Pan Length on One Vibrator!

Moves anything you can't handle with a belt conveyor! Hot or cold, wet or dry, lump or pulverized, packaged or bulk . . . this Hewitt-Robins Vibra-Veyor moves it quickly, quietly, efficiently, at low cost.

Convey material up to 200 feet on one vibrating unit—horizontally . . . down-hill . . . on grades up to 10%. Save on power!

Load it to the hilt at several points along the pan, with any material. It won't bog down. Capacity is limited only by the size of the troughed pan.

Give it rough shock loads! Pan sections are supported by tough malleable iron rockers and soft coil springs—springs that counteract shock loads. The Vibra-Veyor is amazingly quiet—has a full-floating vibrating mechanism.

Install it easily! No special foundation needed, because there's no vibration in the base structure. Your own men can anchor it. Simple to maintain—only 4 points to lubricate.

Applications almost limitless! Tell us your hard-to-handle materials handling problem, and we'll build a Vibra-Veyor to solve it. Get the whole story in Bulletin 135. Write to Robins Conveyors Division, Passaic, New Jersey.

HEWITT-ROBINS
VIBRA-VEYOR

HEWITT-ROBINS HR **INCORPORATED**

BELT CONVEYORS *(belting and machinery)* • BELT AND BUCKET ELEVATORS
CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS
FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS
RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS
TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

'51 Peak Steel Year

Neither full-scale war, "inc dents", nor peace will bud today's high-level operations

By C. M. WHITE
President
Republic Steel Corp.
Cleveland

BEFORE looking ahead I should li to look back for a moment. Ninetee fifty was a year of good busine with high operations which yield a good profit. It was also a year rapidly mounting costs which we climaxed by a substantial wage crease in the steel industry late the year. This increase alone nec sitated a 5½ per cent price incre on steel products; it did not inch sharply increased costs on materi equipment and services.

Under almost any circumstan which can be foreseen, 1951 sho every indication of being anoth year of peak operations with eve facility in our company functioni at top speed. This will be the ca whether we have a full-blown Wo War III on our hands or a series 'incidents' or, to be most desired, return to some semblance of pea

Little Possibility of Peace—C tainly existing conditions point little possibility of 1951 as a year peace. Too little skill has been s is being shown in our diplomacy a planning to give any basis for ho

Korea came upon the nation w no warning. Then when we belie the Korean war was over we fou overwhelming hordes of Chinese R (agrarian reformers) forcing eva ation of our troops and loss of our gains. How many more wars c we carry on almost alone for wo freedom without losing our own?

A clear-cut factual statement fr the State Department informing of the true situation in Korea as as security permits would at le give some indication of what country is facing. We should ha the facts about casualties not o among our own troops but amo those of other nations, and th casualties might well be shown their relationship to the populat of those nations.

It is apparent that the vast c tributions being made by this co try to the rearmament of nati abroad seem to have little relati ship to the number of men those n tions are actually willing to ass to fight shoulder-to-shoulder with in Korea.

With the situation as it is w can feel optimistic about the futu

There will certainly be increa

a production whether the nation
s it or not. We must make up
ive years of unpreparedness and
ust make rearming a major oc-
tion.

Customer Shipments Cut 25%—
r these conditions a reduction
vilian goods is certainly ahead
s. We are even now forced to
il the orders of our regular cus-
rs because of extremely heavy
ands for 'defense orders' and
rnment allocated programs which
ave agreed to accept and give
consideration. On many of our
ucts we have been forced to re-
our shipments to customers by
er cent.

No nation yet has been able to
or prepare for a major war
at the same time supply all the
s of its civilian population. To
a productive capacity great
igh to do both would be economic
de for any nation.

our opinion there will be full
loyment during the coming year.
a matter of fact, there is a scar-
of workers even today. We shall
n have to enlist the help of peo-
who have retired, of women and
narginal workers.

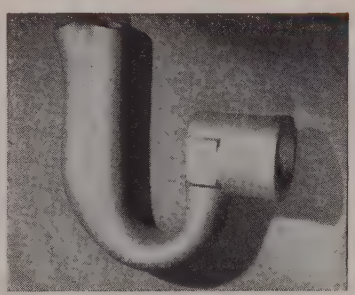
Taxes Will Determine Profits—
fits for the coming year will de-
d very largely on the final action
Congress in connection with taxes.
ile it is politically popular to tax
iness heavily, such a program can
ily be dangerous to our country's
ure and to our ability to maintain
selves in a war-threatened world.
ich expansion now being demanded
st be financed from profits. If
fits are taxed away, expansion
grams may well dwindle.

Briefly, the course of events in
51 is dependent to a large extent
governmental action. We are in
l sympathy with our government
its every effort to bring about
rld peace, but in the light of what
happening we are grievously con-
ned about the outlook for the peo-
of this country not only for 1951
t for the years to come. Nineteen
ty-one will be a busy year, but I
ubt whether anyone will get very
uch satisfaction out of it.

ndling Show Indoors and Out

Making use of an outdoor exhibit
ea for the first time will be the
aterials Handling Exposition, to be
ld at International Amphitheatre,
icago, April 30 to May 4. This
ace will be used in addition to the
door exhibit space to make possible
tual demonstrations of yard han-
ing machines such as cranes, con-
yors and similar equipment that
uld not be moved indoors.

Here's the Light way to do it...



This tough, Well-Cast magnesium portable tool part is typical of how light you can make *your* product. It weighs only a few ounces.

Want to lose some weight?

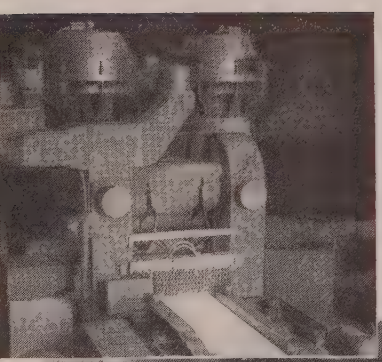
40 years' experience

ALUMINUM AND MAGNESIUM SAND, SEMI-PERMANENT AND PERMANENT MOLD CASTINGS. WELL-MADE WOOD AND METAL PATTERNS.

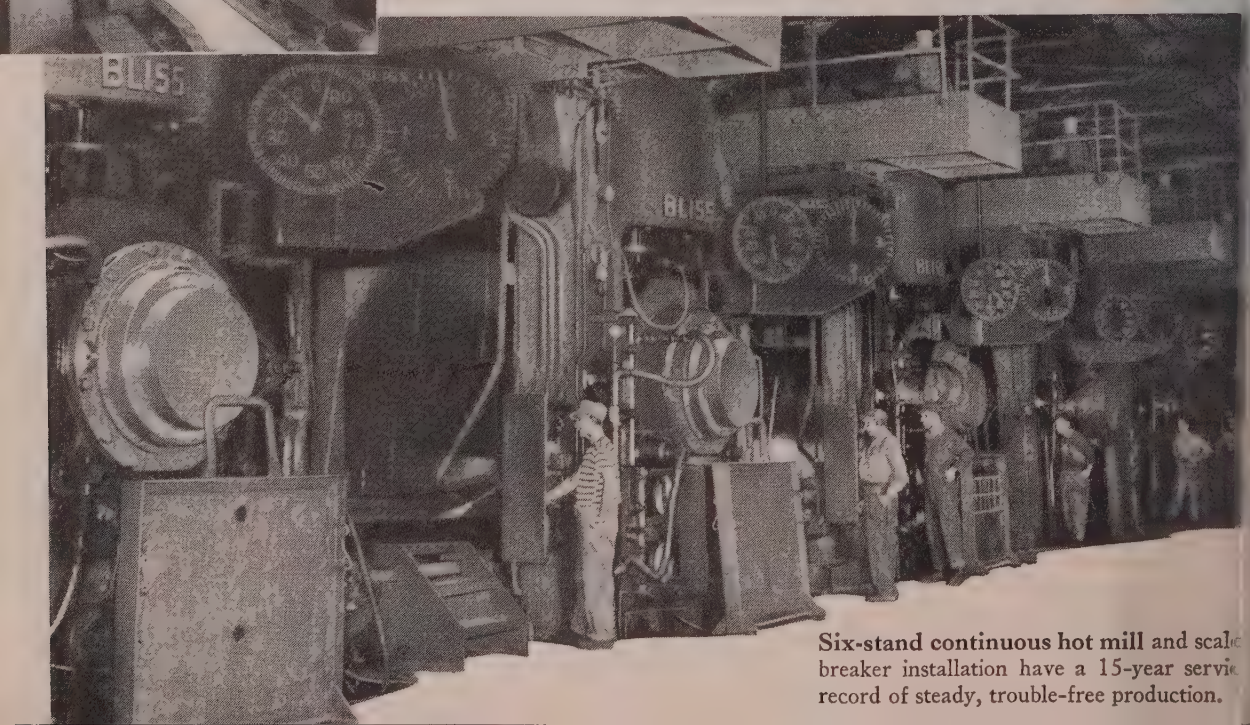
THE WELLMAN BRONZE & ALUMINUM CO.

2521 EAST 93rd STREET • CLEVELAND, OHIO

Bliss Mills Roll Record Tonnage at South's Leadin Steel Plant



Scalebreaker prepares hot steel for continuous mill.



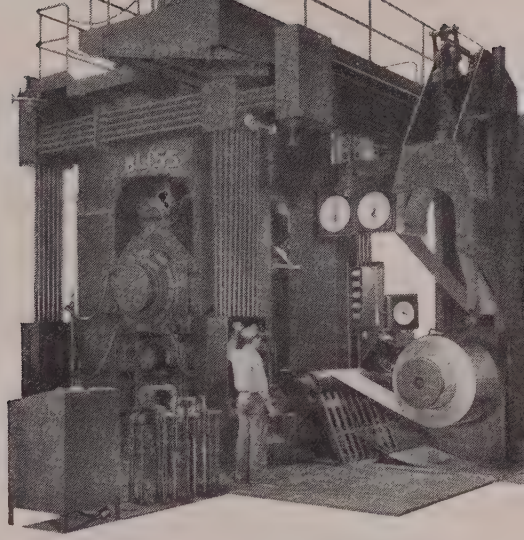
Six-stand continuous hot mill and scale breaker installation have a 15-year servi record of steady, trouble-free production.

IN BOTH hot and cold rolling, production records are a habit at the South's leading steel plant. Here a complete array of Bliss mills produces quality metals to meet the growing demands of Southern industries.

A new Bliss four-high temper pass mill, for example, recently delivered a record tonnage in eight hours. And five Bliss two-stand tandem mills have produced beyond rated capacity since the first installation in 1938.

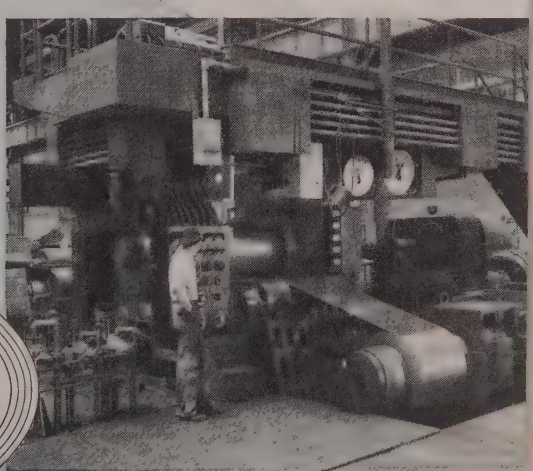
For hot breakdown and finishing, the Bliss scalebreaker and six-stand, continuous mill have given more than 15 years of steady performance without any trouble, taking round-the-clock operation so well that more powerful motors are being installed for even greater speed.

Whether your rolling is hot or cold, ferrous or non-ferrous, breakdown, rundown or finishing, Bliss mills are available to give you better-than-rated production. Built for precision work at maximum speeds, they take the abuse of continuous high-speed operation with least possible maintenance.



Four-high temper pass mill recently rolled a record tonnage of steel in eight hours. Above, it tempers 20-gauge steel at 3000 f.p.m., handles 30 to 13 gauge, 20″ to 48″ wide.

Four-high tandem mills produce more than capacity tonnage. Since the first of five such installations in 1938, they have delivered even beyond rated capacity. Material must meet exacting "specs" for flatness and temper.



Two-high mill is combination sheet and coil mill. It finish rolls 30 to 13 gauge...20″ to 48″ wide.

E. W. Bliss Company

General Offices: Canton, Ohio

Rolling Mill Division

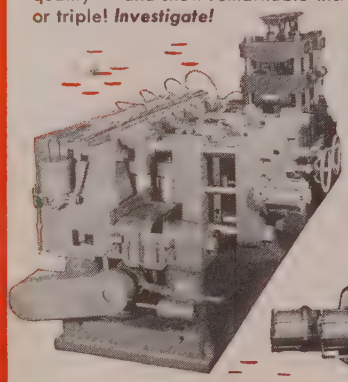
Salem, Ohio

Boost Cold Finished Bar & Tube Output!

with MEDART

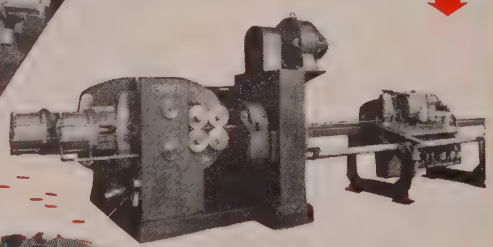
COLD FINISHING MACHINES

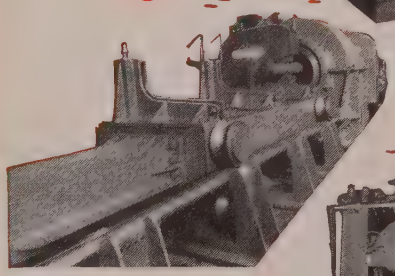
Medart Equipment can fulfill today's urgent demand for ***more and faster production!*** Used in virtually every steel and non-ferrous mill in the country, Medart Machines have ***proved*** they can keep costs down — give closer control over quality — and show remarkable increases in output, in some cases almost double or triple! ***Investigate!***



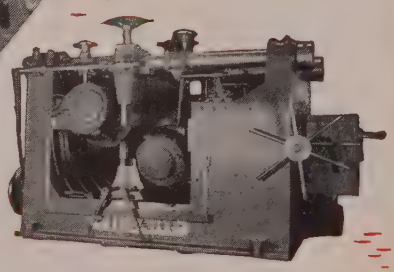
SHAPE STRAIGHTENER — Model TPVC
For large production at extremely high speeds. Handles squares, flats, octagons, hexagons in 2 planes without roll changes.

CENTERLESS BAR TURNER
Doubles grinding department production. Patented "torque-chipping" feature and push-draw feed turns bars small as ¼" at very high speeds.





BILLET PEELERS
A complete line handles ferrous or non-ferrous billets 1" to 14" in diameter at up to 40 ft. per minute.



STRAIGHTENING, SIZING, POLISHING MACHINES
Equipment to meet every need for precision top-speed production on round bars, tubing and pipe. "Medart Finish" has become the standard of the industry.

Write FOR CATALOGS
Straightening, Turning, Polishing, Sizing Machines—Bar And Billet Peelers—Centering Machines—Tube Derodders—Bar Pointing Machines, etc.

THE MEDART COMPANY
3500 DE KALB ST. ST. LOUIS 18, MO.

Nickel Supply Assured

Canadian production reach about 250 million pounds d ing 1950's operations

"DESPITE the fact that nickel in tight supply during the latter of 1950, the amount available for tribution and governmental stock ing was the largest for any pe time year in the history of the nadian nickel industry," Dr. John Thompson, president of Inte tional Nickel Co. of Canada L world's largest producer of nic stated today in his annual rev of the nickel industry.

"In the latter part of June, p to the Korean conflict, when it came apparent that the demand nickel would exceed the avail supply, a voluntary rationing gram was put into effect. Altho nickel, like other metals, remain tight supply, military requirem are being met in full and shipm are being made to government st piles. The trade's civilian requ ments continue, however, to take major portion of the world's sup Canadian nickel production for will reach about 250 million pou

"In the United States on last 2 an order was issued by the tional Production Authority limi the nonmilitary consumption nickel in the first quarter of 195 65 per cent of the average quart rate of consumption during the period comprising the first six mo of 1950. The order is stated t designed to maintain equitable di bution, through normal channels that amount of primary nickel maining after meeting the req ment of the national defense.

Nickel Alloy Steels—"The stee dustry of the world as in past y again accounted for the largest tion of the nickel consumed in and the demand by this industry appreciably above that of last y The proportion of nickel-contai grades to the total production of gineering alloy steels did not ap ciably alter during the year, altho in the later months some reshuf between individual grades was ne sary.

"Rapid strides made in low perature processing and the gro interest in bulk storage of liqu gases resulted in an increased us the straight nickel steels during early part of the year. Low ca 2½ per cent nickel and low ca 3½ per cent nickel steels are standard grades for temperature minus 20°F to minus 150°F, and carbon 9 per cent nickel steel is

used for temperatures as low as of liquid nitrogen.

ainless Steels—"During the first months of 1950 production of less steels in the United States the largest of any similar period he history of the steel industry. average quarterly production in excess of 195,000 tons. Intions are that the output for the year may approach 750,000 tons. 60 per cent of this production xpected to be nickel-containing les, which will account for a large ion of the steel industry's nickel sumption.

Defense plans being formulated at ent will create heavy demands

Stainless Steel Popsicles

Next time your son or daughter requests a popsicle or ice cream sucker, remember that stainless steel played an important part in its manufacture.

Problem facing Anderson Brothers Mfg. Co., Rockford, Ill. in making the unit was the swaging operation which required a specific and consistent temper in the tubing. Its engineers and metallurgists from Carpenter Steel Co., Union, N. J., co-operated in developing a special tempered type 304 stainless tubing suiting the job's requirements. Equipment is designed to hold many popsicle pallets or sticks at one time, each unit containing 48 stainless tubes provided with a special bright annealed finish. Tubes are flared and punched on one end and swaged on the other for tight fits of the pallets that hold the sucker.

stainless steels in applications esntial to national preparedness.

"The extra low carbon grades of ainless steels continued to receive tention. These steels were used for elded and other equipment for hich stress relieving treatments are quired.

Mill and Foundry Products—"Genal advances in all fields of industry ring the past year have been rected in the expanding uses of malable nickel and nickel alloys such Monel and Inconel. This expanon had been noted in normal peaceme industry prior to the beginning defense programs.

"Further attention was directed to arket potentialities for Inconel in her areas of high temperature serve including the important furnace

Some Typical Examples

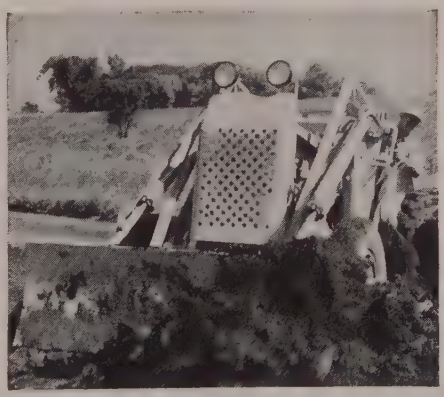
of the use of

Hendrick Perforated Metal

Product designers are utilizing Hendrick Perforated Metal in a steadily widening variety of applications. Three of these are illustrated as suggestions of the wide range of its possible uses.

This Wesix Electric Heater shows an application that combines utility and attractiveness with economy in production.

For screening and straining applications, hundreds of combinations of shapes and sizes of perforations can be furnished in any commercially rolled metal.



Where machinery must be protected without restricting ventilation, Hendrick Perforated Metal is ideal, as in its use for the radiator front of this Lull "Shoveloader."

We shall be glad to recommend the type of perforated metal best suited for use with any particular product.

SEE OUR CATALOG IN SWEET'S

HENDRICK

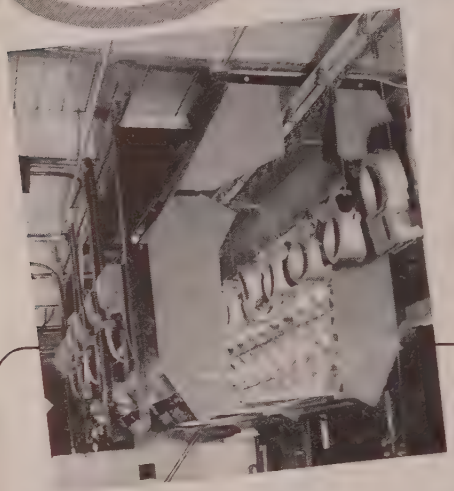
Manufacturing Company

Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids

30 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

THOUSANDS OF PLANTS *Switch to* FOSTORIA INFRA-RED



Most efficient of all industrial ovens for finish baking and other heat applications

SAVES SPACE

Fostoria Infra-red ovens operate on a comparatively short cycle which results in smaller oven requirements. They may also be suspended from ceiling mounts to eliminate floor space entirely.

SAVES TIME

Reduces processing time from hours to minutes because of the inherent speed of Infra-red. There is no time lag in starting an oven, the heat is instantaneous.

SAVES MANPOWER—MANHOURS

Ideal for conveyorized production methods. Reduces excessive product handling. Turns out more pieces per day with ease, with less people.

CUTS COSTS

Faster production, lower operating costs, improved quality, result in lowest "per piece" cost.

Typical of thousands of Fostoria installations replacing former heating or drying methods is the Infra-red oven at Automatic Burner Corp., of Chicago used for finish baking oil and gas burners. Here the light weight Fostoria oven is suspended from the ceiling, saving considerable floor space. The conveyorized system saves much handling. 350 units are now turned out in 8 hours compared with 150 units previously, and finishes are more durable and attractive. No heating up time is required — production is instantaneous with complete flexibility of control.

Throughout industry, new high standards of production efficiency are being set by utilization of the Fostoria Infra-red System. Savings in "per piece" production cost are substantial with many additional advantages on both large and small operations. Whatever your baking, drying, degreasing, or industrial heating problems may be, investigate the high efficiency of Infra-red ovens as engineered by Fostoria. Case histories of installations applicable to your production are available on request.

GET THE FACTS ON FOSTORIA "KNOW HOW" HELP TO REDUCE YOUR "PER PIECE" PRODUCTION COST

Write, today, for this factual information on this Infra-red process and equipment as engineered by Fostoria. Technical data applicable to your operations will be included if you send us general facts about your particular problem. A Fostoria representative will gladly analyze your production needs and submit definite recommendations and carefully forecasted results for your consideration.

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO
Oldest and Largest Manufacturers of Industrial Infra-red Ovens

INFRA-RED fostoria SYSTEM

and heat treating fields. A hot-roll Inconel T-section was introduced i the Huntington, W. Va. works of I ternational Nickel in this connectio The primary purpose of this produ is to provide manufacturers of fu naces and other high temperatu equipment with ready-made and u form structural parts at considera economy over the cost of fabricati those parts in their own shops. Th section can be welded, riveted, otherwise joined without difficulty.

Nickel Alloy Cast Irons — "T unique combination of properties Ni-Resist—resistance to heat, cor sion, wear and erosion, and therm expansion control—has become i creasingly recognized in the past ye in sea water and insecticide pum and valves, engine valve guid steam service, engine liners and gla molds, and for piston ring lands aluminum pistons. Wherever hea duty machines demand this uniq combination of properties, Ni-Resi a cast iron containing nickel, is b ing adopted as standard.

"The company has successfully b gun the commercial production magnesium-containing ductile Ni-R sist during the year just being co pleted. The improved strength a toughness of this new material, wi its resistance to service deteriorati provides an economical ally which being favorably regarded by indust Another new type of Ni-Resist, whi can be hardened after machining, being service tested by many indu tries where resistance to corrosi and abrasion is required.

"Ductile iron, a product of Inte national Nickel's research labor tories introduced early in 1949, h made good progress this year, emer ing from the pilot plant stage to b come an accepted engineering mat rial. It is estimated that the outp from licensed foundries for the ye 1950 will be between 15,000 and 2 000 melt tons compared with 35 tons during 1949.

Copper Base Alloys—"The great output of castings, together with t undiminished use of nickel in ge bronzes, pressure castings and bea ing bronzes, accounted for a larg consumption of nickel in the no ferrous casting field during 1950. A loyed bronzes containing 3 to 5 p cent nickel found applications i constructional and functional pu poses including valves, pumps, gea and machine frames. Nickel cont ued to be employed as an addition f equalizing the distribution of lead bearing bronzes and to improve the mechanical properties. More wide recognized has been the function nickel in imparting high strength a

ness to the aluminum bronzes, as as contributing to their corro- resistance. The high resistance eat and wear of these alloys, has olished their position in aircraft truction for such parts as valve es, valve seats, ring and bush- In Great Britain, ships' pro- rs up to 3¼ tons in weight are being made regularly of a 5 per nickel-aluminum bronze, which ronger and gives better service the manganese-bronze previous- sed."

hat About Appliances?

Material shortages, government directives, industry's ability to produce—all affect output

PLIANCES such as washers, iron- and dryers typify the American of life. We are accustomed to g able to go into the appliance artment, look over a variety of els, then have delivered the item our choice. With world and do- tic conditions being what they shortages of the component ma- als, and therefore the white enam- nished end products, are looming me much nearer to us than the izon.

the following reports, represen- ves of various appliance indus- s appraise the past, present and ure situation as they see it.

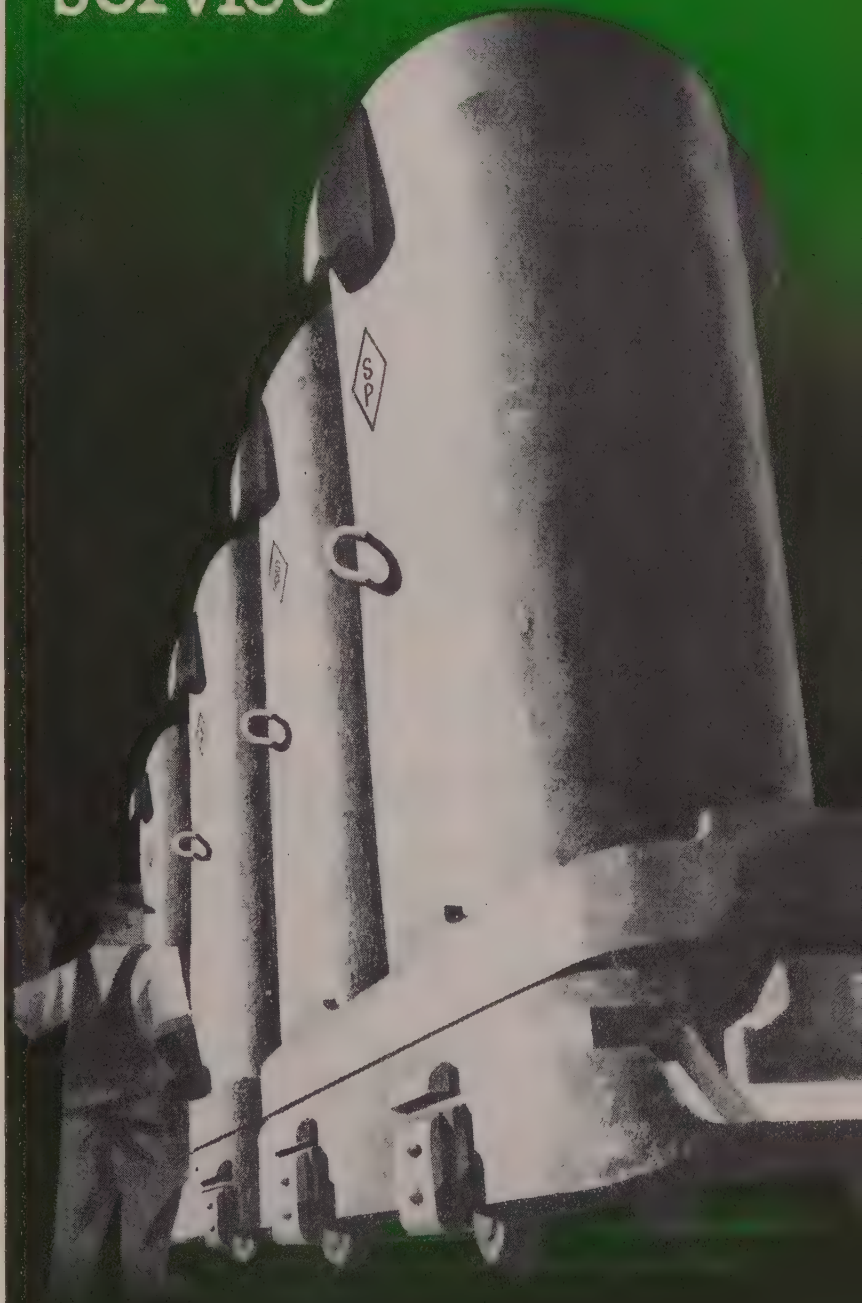
leaner Sales Expected Steady— chases of vacuum cleaners have ved from 1,000,000 units per year to 3,000,000 annually, and even re, through our entire postwar iod. On the basis of conditions re- ining somewhere near normal, it y be assumed that this level will maintained, and even bettered newhat, by the continued flow of provements in the product itself, orts C. G. Frantz, executive sec- ary-treasurer Vacuum Cleaner nufacturers' Association and presi- nt, Apex Electrical Mfg. Co., Cleve- d.

This currently is being accom- shed by the many companies in the lustry, he says. Product improve- nt, when carried out in proper m, is a great stimulant to sales.

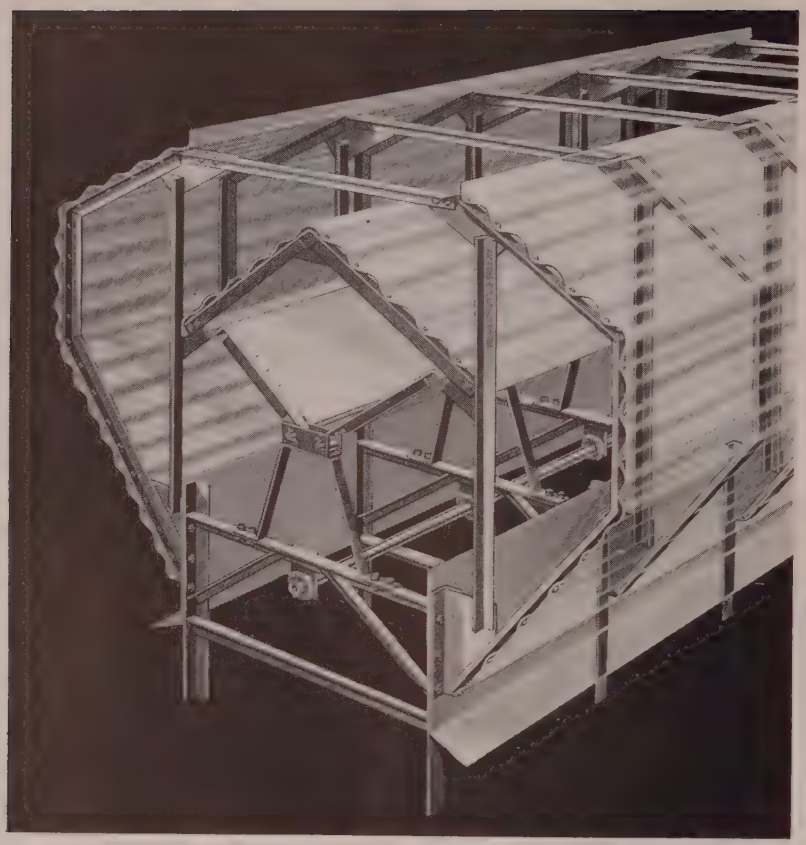
Washers To Enter Buyers Market— estion now is whether production automatic washers will be so lim- d by availability of materials as drop behind our industry's sales ce or whether the effect of install- nt curbs and other influences will ntribute to a buyers' market.

Parker H. Ericksen, chairman, Au- matic Washer Division, American me Laundry Manufacturers' Asso-

experience
skill
service



three priceless assets
behind every
SHENANGO-PENN MOLD
SHENANGO-PENN MOLD COMPANY OLIVER BUILDING PITTSBURGH PENNA.



DON'T SMOTHER YOUR PLANT PRODUCTION WITH INADEQUATE VENTILATION

Slow-downs, rejects, even accidents, may often be traced directly to improper ventilation.

Dead, logy, or fume-laden air must be replaced by fresh, live air constantly. If it isn't, you are *not* getting full value for the man hours you buy.

Burt's specialized experience, of more than fifty years in the design, manufacture and installation of ventilating equipment is your assurance of complete efficiency and satisfaction. Burt engineers will be glad to submit recommendations and specifications, without obligation.

SEE SWEET'S OR WRITE FOR CATALOG AND DATA SHEETS

The **BURT MFG.** *Co.*

905 S. High St. Akron 11, Ohio, U.S.A.

VENTILATORS • LOUVERS • OIL FILTERS • SHEET METAL SPECIALTIES

ciation, and vice president in ch of sales, Bendix Home Applia Inc., South Bend, Ind., thinks the depth and magnitude of th mament program will give the swer. Before this appears in governmental decisions may be that will dictate the characte market which will prevail in 19 to major appliances, he believes

Dryer Sales Growth Will Conti Automatic dryer sales in 1950 six times greater than sales in just three years ago. Looking the future, R. G. Halvorsen, man, Dryer Division, American Laundry Manufacturers' Associ and sales manager, Hamilton Co., Two Rivers, Wis., expects phenomenal growth to continue. timates by industry leaders are to project the sale of 600,000 d for 1951 or about double the sa this year.

He tempers this forecast wit sober realization of the diffic that now confront our manufact who are trying to increase pr tion in spite of material short governmental credit and materi strictions and rising prices.

Shortages To Hurt Vacuum C ers—Actual and threatened cut of materials available for ci products mean that manufact will be hard put to maintain pr tion which will come anywhere adequately serving continued bi satisfied consumer needs.

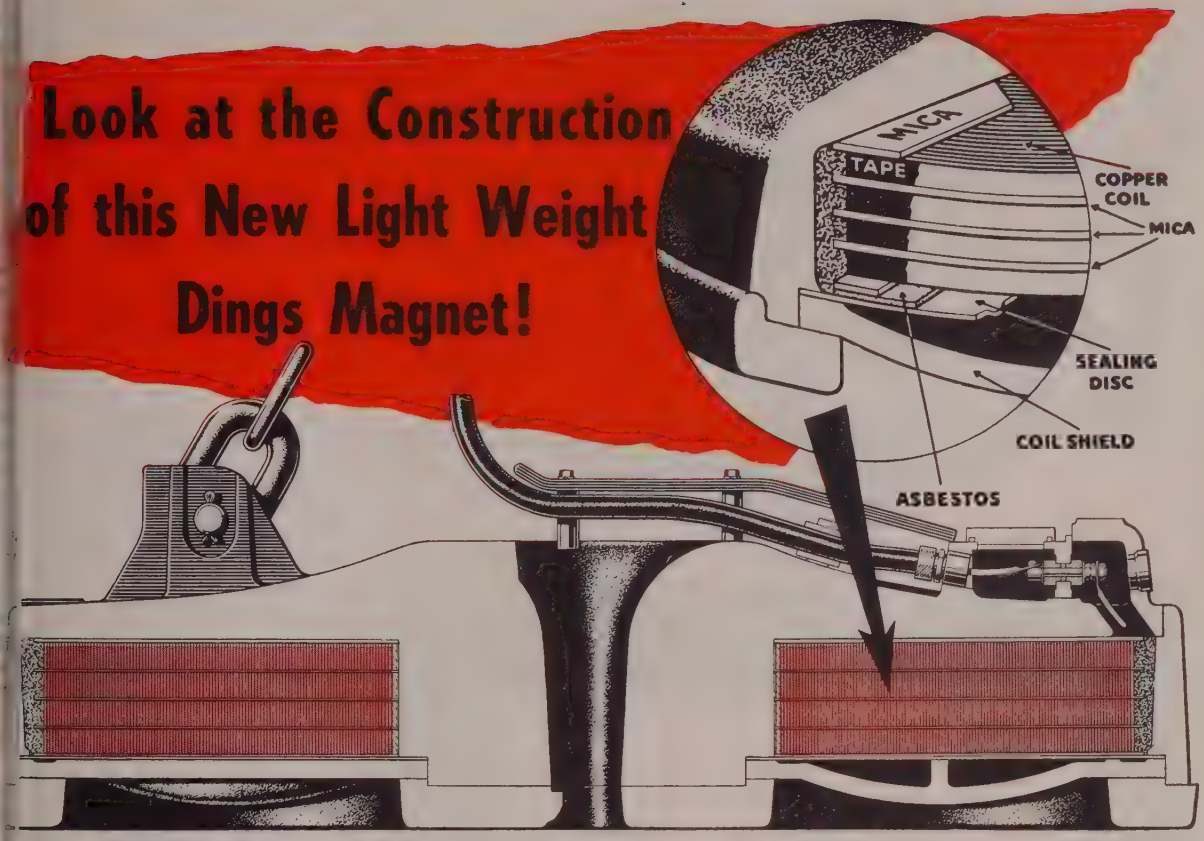
The household vacuum clean dustry has manufactured at a time high rate ever since the e World War II and yet has not c up with the demands of the l number of households in h states George H. Scott, presid Vacuum Cleaner Manufacturer sociation and president, Sco Fetzer Co., Cleveland.

The industry hopes for equable judging of civilian ar fense needs for metals and su to the end that each may be most fairly, yet with least di ance of the national economy Scott says that only time ca how reasonably these adjust will be worked out.

Shortages To Slow Ironer Ou Ironer manufacturers will sel 000 or more in 1950, accord Joseph Groshans, chairman, Division, American Home La Manufacturers' Association, an eral sales manager, Simplex Di Speed Queen Corp., Algonquin

He reports this a creditable considering the fact that the months of the year were sl many lines. Production is ex

Look at the Construction of this New Light Weight Dings Magnet!



IT'S all welded — with a scientifically correct magnetic circuit that allows lighter weight with greater lifting power! And no sacrifice in strength or durability — in fact it has many features to help it better withstand rough and continuous use. Because of this it offers you:

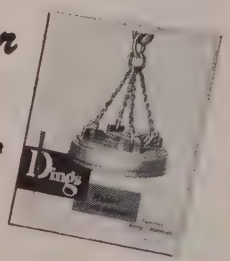
LIFTING ABILITY that *lasts* . . . and *lasts*

Here are the features:

1. WELDED CONSTRUCTION.
2. LIGHT WEIGHT.
3. Tamper-proof, sealed terminal box.
4. Four-point chain suspension. (only Dings has it)
5. Protector guards for the magnet cable. (another Dings exclusive)
6. Scientifically balanced magnetic circuit that eliminates flux bottlenecks and puts maximum power into the lift.

DINGS MAGNETIC SEPARATOR COMPANY
4710 W. Electric Ave., Milwaukee 46, Wis.

Send for Catalog



Number B1401-A just off the press — gives detailed information on capacities, ratings, dimensions. WRITE TODAY.

DINGS *Certified* MAGNETIC STRENGTH

The Gauss strength of every Dings Magnet is measured and certified equal to or greater than the minimum guaranteed. None leaves the factory that fails to meet Dings high standards!

NEW
IRIDITE®
SAVES ZINC
IN BRIGHT FINISHING

This new, chromate, bright-type finish for automatic zinc plating can be applied to zinc plate *of less than .0001" thickness!* It's bluish bright or yellow iridescent in appearance, according to your needs. Resists corrosion, finger marking, staining.

Costs Less To Use— Cost per square foot of treated surface ranges from as low as 3/100c for mill-plated strip to only 1/10c on piece parts. Your present automatic plating cycles present no problem since the solution is completely flexible and can be adapted to any available immersion period, up to more than a full minute. And we've eliminated the need for a bleaching rinse after Iridite. *One dip does it all!* No close controls or special equipment needed.

Costs Less To Ship— The raw materials are a combination of liquid and powder, so you actually *save up to 25%* in shipping costs . . . and you have fewer carboys to handle.

Many manufacturers have already tested and specified this new Iridite finish for all types of zinc-plated products. You will, too, once you've seen and tested it for yourself. *Write today for full information and free samples.* Or, send us a sample of your product for free test processing.

Approved under government specifications.

ALLIED RESEARCH PRODUCTS, INC.
4004 EAST MONUMENT STREET
BALTIMORE 5, MD.

REPRESENTATIVES IN PRINCIPAL INDUSTRIAL CITIES; West Coast: L. H. BUTCHER COMPANY.
Manufacturers of Iridite Finishes
for Corrosion Resistance and Paint Systems for Non-Ferrous Metals; ARP Plating Chemicals.

to be off in 1951 because of mate shortages.

Washington Is ? In Washers—H well demand holds for conventio washing machines depends wh upon the degree of Washington's operation in making available s materials as aluminum, copper, z rubber, iron, steel and plating ma rials, to mention only a few. T is the belief of Walter K. Voss, ch man, Conventional Washer Divis American Home Laundry Manuf turers' Association, and president general manager, Voss Bros. M Co., Davenport, Iowa.

"There ought to be some comm sense middle ground between the travagant and unorganized dema of government agencies and the q minor needs of our industry," states.

If the industry is prevented fi arriving at some workable and in ligent compromises, it is thought t the dealer will face only an "un sonable facsimile" of the condit he had to fight to stay in busi through World War II.

Already material shortages h caused many production proble with suppliers so uncertain a government plans and regulat that the washer industry is sai be having a harder and harder t inducing them to accept orders the first quarter of 1951.

The demand for conventional w ers has been very good through 1 Manufacturers are reported to h enough orders on their books to k them busy through the ope months of 1951, but according to Voss, the question is: Will the in try be permitted to have enough terials to make the washers w dealers have ordered?

Report on Steel Microstructu

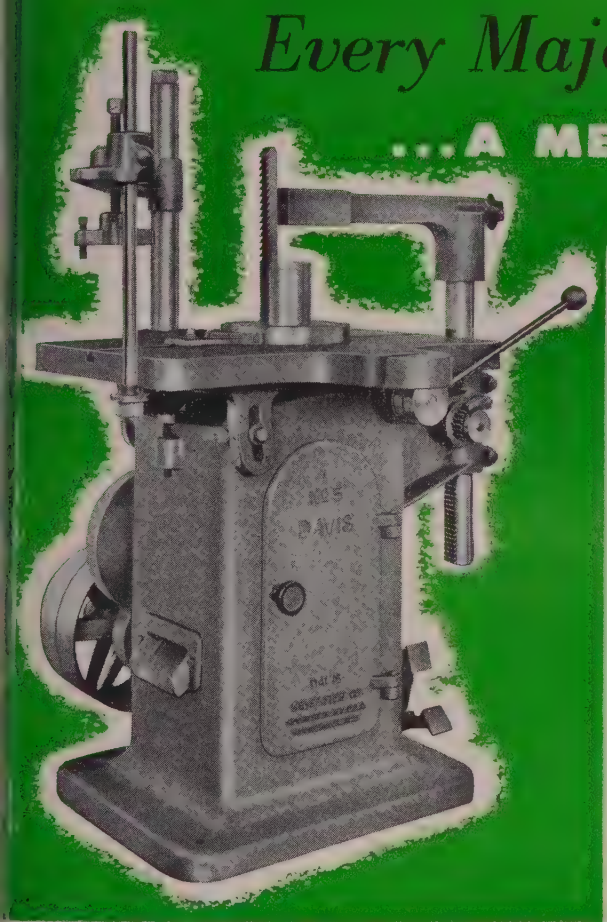
Including 47 specially prep figures constituting electron m graphs of various steel constituen a report on electron microstruc of steel, prepared by American ciety for Testing Materials.

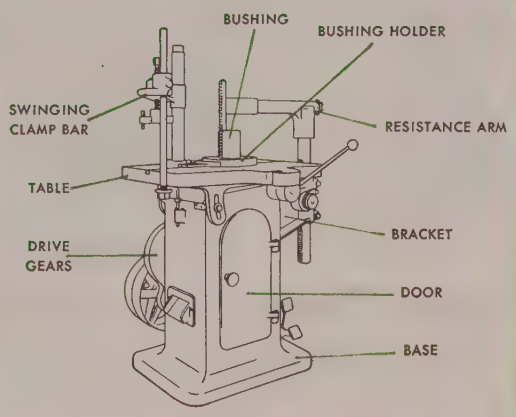
Program for the studies incl variations in metallographic po ing and etching practices for re techniques and photographic pr dures. Both mechanical polis and electropolishing were used, the former was used predomina in obtaining results made avai in the report.

Micrographs were made at initial magnification of 5000, were enlarged to a final magnifica of 15,000. Report is available the society, 1916 Race St., Phila phia 3, Pa., for $1.35.

Every Major Component—

...A MEEHANITE CASTING





Take *Your* Casting Problem To A Meehanite Foundry

American Brake Shoe Co. ..... Mahwah, New Jersey
The American Laundry Machinery Co. ..... Rochester, New York
Atlas Foundry Co. ..... Detroit, Michigan
Banner Iron Works ..... St. Louis, Missouri
Barnett Foundry & Machine Co. ..... Irvington, New Jersey
E. W. Bliss Co. ..... Hastings, Mich. and Toledo, O.
Builders Iron Foundry ..... Providence, Rhode Island
Continental Gin Co. ..... Birmingham, Alabama
Crawford & Doherty Foundry Co. ..... Portland, Oregon
The Cooper-Bessemer Corp. ..Mt. Vernon, Ohio and Grove City, Pa.
Farrel-Birmingham Co., Inc. ..... Ansonia, Connecticut
Florence Pipe Foundry & Machine Co. ..... Florence, New Jersey
Fulton Foundry & Machine Co., Inc. ..... Cleveland, Ohio
General Foundry & Manufacturing Co. ..... Flint, Michigan
Greenlee Foundry Co. ..... Chicago, Illinois
The Hamilton Foundry & Machine Co. ..... Hamilton, Ohio
Johnstone Foundries, Inc. ..... Grove City, Pennsylvania
Kanawha Manufacturing Co. ..... Charleston, West Virginia
Koehring Co. ..... Milwaukee, Wisconsin
Lincoln Foundry Corp. ..... Los Angeles, California
E. Long Ltd. ..... Orillia, Ontario
Otis Elevator Co., Ltd. ..... Hamilton, Ontario
The Henry Perkins Co. ..... Bridgewater, Massachusetts
Pohlman Foundry Co., Inc. ..... Buffalo, New York
Rosedale Foundry & Machine Co. ..... Pittsburgh, Pennsylvania
Ross-Meehan Foundries ..... Chattanooga, Tennessee
Shenango-Penn Mold Co. ..... Dover, Ohio
Standard Foundry Co. ..... Worcester, Massachusetts
The Stearns-Roger Manufacturing Co. ..... Denver, Colorado
Traylor Engineering & Mfg. Co. ..... Allentown, Pennsylvania
Valley Iron Works, Inc. ..... St. Paul, Minnesota
Vulcan Foundry Co. ..... Oakland, California
Warren Foundry & Pipe Corporation ..... Phillipsburg, New Jersey

"This advertisement sponsored by foundries listed above."

MEEHANITE®

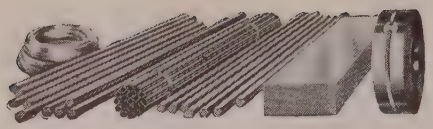
New Rochelle, N. Y.

The Davis Keyseater, manufactured by Davis Keyseater Company, Rochester, N. Y. is another example of precision production equipment built almost entirely with Meehanite castings.

As the illustration indicates every major component is Meehanite casting from drive gears to base. Designers, production engineers, management and purchasing officials have over the years come to recognize that Meehanite castings provide them with certain characteristics which in today's industrial picture are "musts." These are:

1. Dependable design characteristics with a high degree of superiority.
2. Day by day uniformity and soundness.
3. Economy through regular machinability and higher freedom from defects.

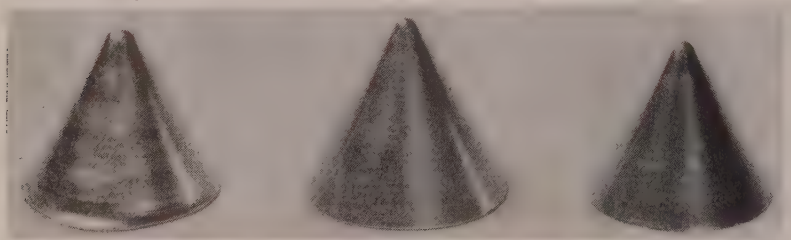
Analyze your design and casting problems or requirements. Take advantage of the basic metallurgical fact that "Meehanite Bridges the Gap between Cast Iron and Steel®", combining the better properties of both. Ask any of the Meehanite foundries listed below for the Meehanite Handbook, 67 pages of engineering information.



BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

"Bridgeport" BRASS CO. MILLS IN BRIDGEPORT, CONN. AND INDIANAPOLIS, IND.—IN CANADA: NORANDA COPPER AND BRASS LIMITED, MONTRE



Stages of production of copper cone shows: the cup produced in an eyelet machine with no wall thinning; the cup after stamping, in which the wall is tapered from 0.024 in. to 0.032 in.; finished cone after trimming in shimmy die—Courtesy John Ahlbin & Sons, Inc., Bridgeport, Conn.

Copper Cone Accurately Stamped with Punch and Die Inserts

The use of inserts in header dies has increased die life by reducing the tendency of dies to crack.

Using this same principle, it was possible to stamp the illustrated copper cone without cracking of either the punch or die.

The finished part has a large diameter of 1-1/4 inches and is 1-3/16 inches high. It is essential that the wall taper from 0.024 in. at the tip of the cone to 0.032 in. at the mouth.

The cup for the stamping operation is made in a multiple-plunger press by the folding method, from 0.032 in. copper strip. The blank is then annealed.

Solid Dies Fail

When the cone was first engineered, solid dies were made. Due to the pressure necessary to taper the wall 0.008 in., cracking of both punch and die occurred. If the punch was drawn back to a softer temper, it then would be pounded into the shape of the die, removing the difference in angle to obtain the tapered wall thickness. Finally inserts were made of 5% chromium hot-work steel. These were hardened and drawn to a 60-61 Rockwell C hardness and chrome plated, then shrunk into holders.

The holders were made from tool steel but not hardened, making stro tough backup material for the dies. T hardness of the punch and die, plus t chrome plating, cut wear to a mi mum. The chrome plate also reduc the tendency to gall.

A bottom-stroke press was selecte Impact was therefore minimized. T press was aligned and it was found th an open die set produced accura shells with a variation of not more th 0.001 around the cup.

Accurate Cups Necessary

Accurate cups from the eyelet op ation with a minimum of variati were found necessary to control c centricity.

Trimming of the finished cone p sented another problem. The edge h to be parallel to the horizontal axis the cone. Distortion also had to eliminated. A shimmy die, operated four cams, was chosen.

The bottom die was made to nest t cone accurately. The tip of the pur fitted snugly and was spring-load with a universal action and the cutti action was from the inside of the c outward. The trimmed edge was cle

Since a soft cone was required, was given a full anneal after the tri ming operation.

Stress Relief Anneal Needed to Protect Coldworked Parts

Coldworking, such as stamping, roll threading and drawing, especially of the high brasses, sets up stresses in the part which under humid conditions can produce season cracking.

When copper-base alloys are highly stressed, season cracking is not inevitable since four other requisites are involved: ammonia, moisture, oxygen, and type of alloy.

The history of the illustrated oil reservoir cap shows to some extent the phenomenon of season cracking.

The shell which cracked not only was drawn into a cup but a very coarse broad thread was rolled on.

For several years this cap gave good service. The tank and cap were always left on the heater, in the kitchen.

However, one summer the tank was left in the cellar. When an attempt to remove the cap was made in the fall, a strap wrench was necessary.

Examination showed a crack running from the lip to almost the base which caused the shell to go out of round and bind. Another cap was purchased and the following summer the tank was again left in the cellar. The same thing happened under the humid, musty conditions in the cellar. However, the cap on a second tank did not crack when it was kept in the kitchen.

Removal of Stresses Needed

Stress relief annealing at a temperature below the recrystallization point of the high brass would have relieved the residual stresses set up by coldworking and preventing cracking.

The use of copper or high copper alloys above 85% copper such as red brass, gilding metal and the silic bronzes will help to reduce the dan of season cracking, but very hig stressed metals, no matter what alloy is, should be stress relief nealed to insure against such failu

(6129)

Yellow brass cap for oil reservoir which sea cracked due to stresses set up in roll thread operation.

CAUSES OF CORROSION

This article is one of a series of discussions by H. L. Bulow, research chemist of the Bridgeport Brass Company.

DEZINCIFICATION AND SIMILAR TYPES OF CORROSION

Dezincification is a type of corrosion which may occur under prolonged exposure to certain moist or wet conditions in copper-zinc alloys (brasses), containing less than 85% copper and generally in the absence of a dezincification inhibitor. Zinc is lost from the brass leaving as a residue or by a process of redeposition a zinc-free mass of copper having very little mechanical strength. Consequently, little or no reduction occurs in the dimensions of the section of metal; sometimes a slight increase in dimensions may occur.

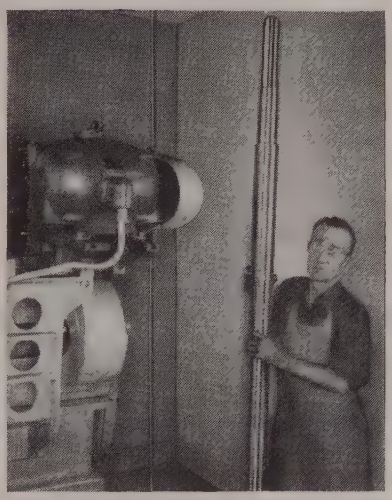
This disappearance of one of the elements from a binary alloy is not peculiar to the copper-zinc alloys alone. Under certain corrosive conditions and concentrations of alloying elements corrosion of a similar nature may occur in silver-copper alloys. 93% silver, 7% copper alloy handles on buried baskets have undergone decuprification.[1]

Gold-silver alloys strip containing 10 to 30% gold immersed in 1 to 3 nitric acid-water mixture undergoes rapid removal of the silver from the alloy, leaving a porous coherent strip of gold. This procedure is the basis for the "parting" operation in assaying for gold.[2]

Similar types of corrosion occasionally take place in other copper-base alloys such as; dealuminumization in copper-aluminum alloys, denickelification in copper-nickel alloys, demanganzation in copper-manganese alloys, etc. In all of the instances cited, the more noble or cathodic element remains and the more active or anodic element is dissolved with the formation of metal ions.

[1]Also see discussion by Colin G. Fink in Trans. Electrochem. Soc. 75, 440 (1939).

[2]O. C. Shepard and W. F. Detrich, Fire Assaying, 1st Ed. pp. 75-84, McGraw-Hill Book Co. (1940).



Stationary valve stem 7½ feet long and 3½ inches dia. machined from silicon aluminum bronze (Duronze III) — Courtesy Eddy Valve Company, Waterford, N. Y.

Silicon Aluminum Bronze Used for 7½-Ft. Valve Stem

High strength, smoothly machined surfaces and resistance to corrosion, wear and galling are especially essential in stems for large water valves.

The illustrated stem, of silicon aluminum bronze (Duronze III), is 3½ inches in diameter at the largest point and is 7½ feet long.

Used in a stationary stem valve, it has two square threads per inch for 53½ inches on the 3½ in. diameter and 3½ threads per inch for 10 inches on the 3-in. diameter on the opposite end. A ¾-⅜ key slot is milled through this thread.

All turning and chasing of threads was done on centers in a lathe with high speed tools. Sharp tools on this alloy will produce clean, smooth finishes even at very low surface speeds.

The rod was extruded, then drawn to size and annealed. In this condition it had the high tensile strength of 85,000 psi with a hardness of B85 (Rockwell).

Friction between the silicon aluminum bronze stem and the manganese bronze nut is lower due to the dissimilarity of metals. Galling is also minimized. This is important in motor-driven valves as galling or seizure of any type would throw too much of a load on the motor and gear systems.

Silicon aluminum bronze (91% copper, 7% aluminum, 2% silicon) has better corrosion resistance than brass which is subject to dezincification in some types of water. The anneal given the rod also insures against season cracking. (6129)

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Roll Type Expanding Tool assembles ½" to 1½" tubes in heat exchangers. The new tool is designed for self-feeding action, parallel rolling with tapered rolls, nosed rolls to eliminate sharp edges. Made in a range of sizes the shortest will roll into sheets from ½" to 1½" in thickness, the largest from 1¼" to 2¼". Tool is suited for manual or automatic control. **No. 1116**

Double Acting Hydraulic Presses employ separate circuits and pumps for the ram and blankholder movements. Operation includes provision to slow down ram movement at the instant the blankholder is picked up on return stroke, reportedly eliminating shock when ram contacts blankholder. **No. 1117**

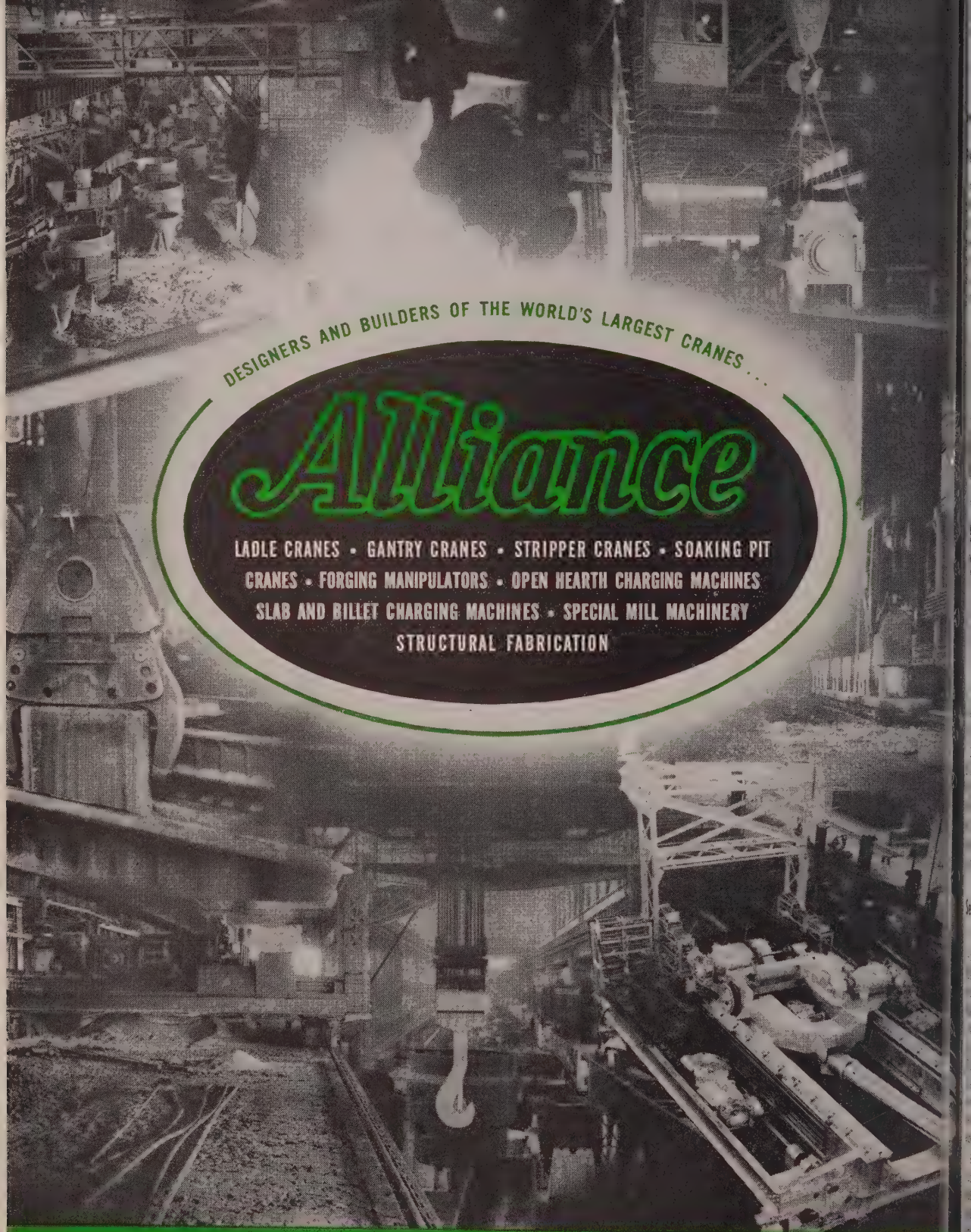
Hand Tachometer with recording chart. Reads and records 30 to 48,000 rpm. Instrument employs centrifugal mechanism to move pointer over 3" dial. Controlled selection gears provide for three speed range combinations: 30 to 12,000, 60 to 24,000 and 120 to 48,000 rpm. Recorder operates disc scale markers, time marker and pen over 2¾" strip chart driven by spring motor. The tachometer can be fitted with a 6" disc to read in fpm as well as in rpm. **No. 1118**

Metal Stripper claimed to remove plate from copper, brass and other copper-base alloys without attack of base metal. Nickel, tin, lead and chromium can be stripped by immersing work in mixture of powder stripper and acid solution. Stripping rates as high as 0.006" per hour of nickel are reported. No electric current is needed. Stripping can be done at room temperature, or higher if greater speed is desired. **No. 1119**

Portable Electric Grinding Tool drives 3" discs, weighs 4½ lbs. Has 12,000 rpm, air-filtered motor with permanently lubricated and sealed bearings. Aluminum housing is 3" in dia., overall length is 7½". Tool is said to be suited for tool sharpening as well as the usual types of disc work. **No. 1120**

Roll-Type Bending Machine makes coils from bar and pipe stock. Three sizes take pipe from 1¼" to 3½" and will produce minimum radius of 9" to 16". The same machines will bend square bars measuring 1" to 2" to a 12" or 24" minimum radius. The roll motor rates 2 to 15 hp, and the hydraulic pressure motor which drives the vertically-adjustable upper roll is 1 to 3 hp. Floor space is about 4 by 4½ ft. to 7½ by 12 ft. **No. 1121**

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL
"Bridgeport" BRASS CO.
BRIDGEPORT BRASS
BRIDGEPORT BRASS COMPANY, BRIDGEPORT 2, CONN. • ESTABLISHED 1865
Mills at Bridgeport, Connecticut, and Indianapolis, Indiana • In Canada: Noranda Copper and Brass Limited, Montreal
Warehouse Service with Slitting Facilities in Principal Cities
Advertisement


DESIGNERS AND BUILDERS OF THE WORLD'S LARGEST CRANES . . .
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SLAB AND BILLET CHARGING MACHINES • SPECIAL MILL MACHINERY
STRUCTURAL FABRICATION

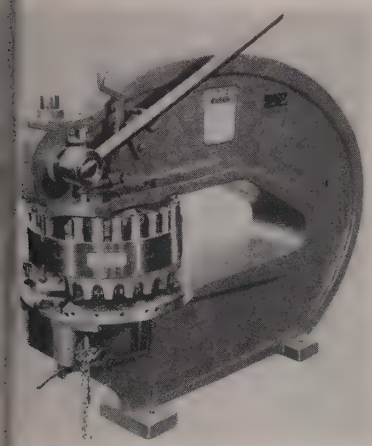
THE ALLIANCE MACHINE COMPAN

Main Office
ALLIANCE, OHIO

Pittsburgh Office
1622 OLIVER BLDG., PITTSBURGH,

ess Handles 48-Inch Sheets

Able to accommodate sheet ma- ial up to 48 inches wide in its -inch throat is the model 18B punch ess with rotary turret, produced Rotex Punch Co., 4726 E. 12th , Oakland, Calif. Turret design rmits operator to locate any one



18 desired punch sizes almost in- antly, locking in position once the lection is made.

Punches range in size from 5/64 to inches and will punch any material p to the equivalent of 10-gage sheet on. Dies and punches are prealigned. safety lock prevents damage to ork, punches or dies if machine is ot properly aligned.

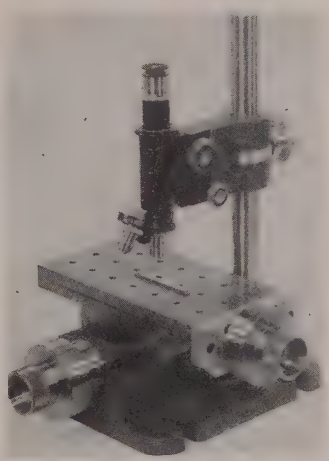
elective Storage System

Storage of such diversified ma- erials as rough stock, pallets, drums, ies, patterns and tote boxes with omplete selectivity is possible with he Stak-Rak system developed by hicago Tramrail Corp., 4000 W. Washington Blvd., Chicago 24, Ill. With its one-man pushbutton control, he operator delivers in-coming ma- erials to specified position, quickly elects required materials from stor- ge and delivers them where needed.

System consists of self-supporting ack-columns designed to receive re- uired material and arranged on ither side of narrow aisles. A crane ridge spanning the entire width of he storage area is equipped with verhead trolley from which is sus- ended an electric fork lift. The atter revolves to serve either side f the aisles. The system can be dapted to handling of skid boxes or other self-stacking fixtures and may be used with or without pallets. Fork lift may be supplied with 36-inch forks with horizontal spread of 3 feet or multiple fork for handling long materials with a 10-foot spread.

Compound Microscope Base

Designed for tool, die and instrument makers is a compound microscope base with a longitudinal travel of 6 inches and transverse travel of 4 inches, made by Erb & Gray, 854 South Figueroa St., Los Angeles 17, Calif. Made with calibrated drums reading directly to 0.0001-inch, it has hold-down ears on 6-inch centers that permit mounting on mills, jig borers and surface tables. Dovetail ways permit large and nonsymmetrical



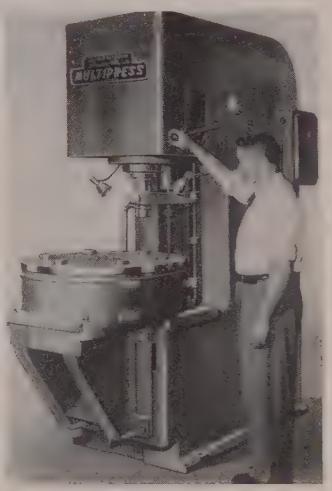
parts to be bolted to the table without binding or distortion.

Examination of large parts is possible by an extension arm placing the microscope body 18 to 24 inches from the table. Base can be furnished in a variety of optical combinations with a wide range of magnification.

High Production 50-Ton Press

Denison Engineering Co., 1160 Dublin Rd., Columbus 16, O. is introducing a 50-ton oil hydraulic multipress with fast action at high tonnage pressures under accurate regulative control. Press has a 15-inch stroke, 24-inch daylight opening and work surface of 19½ x 31 inches.

Approach of ram to work is variable and can be preset at any speed up to a maximum of 290 inches per minute, with pressing speeds up to 145 inches per minute. Both speeds are independently adjustable. Other operational features which may be preset include ram stroke, length and pressure. Press may be equipped with dual hand lever, single lever, foot pedal or electric pushbutton



controls and is available in manual and automatic models for single or continuous cycling or vibratory repeat strokes. A 33-inch diameter hydraulic index table may be installed, providing for indexing of either 6 or 12 stations.

Safe Solvent Cleaner

Capable of using petroleum, emulsion and light compound solutions, as well as toxic and nontoxic solvents is the SolVoJet cleaner, made by Phillips Mfg. Co., 3475 Touhy Ave., Chicago 45, Ill. Room temperature solvent action removes soil, while pres-

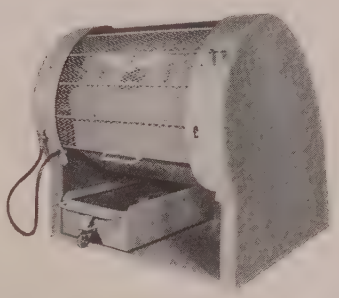
sure jet required to dislodge more stubborn particles is supplied by a mechanically sealed rotary pump, op-

erated by a foot switch. A valve permits regulation of the pressure.

Operator can manipulate the jet of solvent with one hand while moving the part with the other. Cleaned parts are then drained or blown off with compressed air. Inside dimensions of tank are 16 x 18 x 36 inches. Sump capacity is 11 gallons.

Larger Tumbling Machine

Designed with an increased capacity for grinding, deburring and finishing metal products is a tumbling machine offered by Gravi-i-Flow Corp., 400 Norwood Ave., Sturgis, Mich. Using chips and compounds to produce smooth and high luster surfaces, the machine has two 24 x 40-inch ID compartments. These are furnished with ½-inch plate unlined

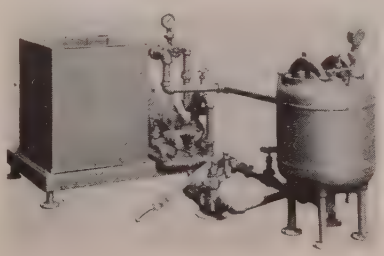


or ¼-inch plate rubber-lined. Doors have cam locks with manually released safety stops to provide pressure relief.

Magnetic starter has reduced voltage control. A limit switch on the safety guard cuts off current to stop barrel rotation when guard is lifted. The 220-440 v 5 hp motor has a magnetic brake. Water and electrical services are integral with the machine. A motor-driven separator for removing chips from parts is available as extra equipment.

Unit Seals Porous Castings

Pressure castings rejected because of porosity may be sealed by impregnating equipment announced by Tincher Products Co., 858 Borden Ave.,



Sycamore, Ill. Equipment is a complete unit and requires no plant alterations or skill to operate.

A part or casting once sealed is pressure tight for the life of the part. An impregnated casting will withstand any pressure, temperature and chemical condition that the part was designed for. Both ferrous and nonferrous pieces may be sealed before or after machining. Once the part has been impregnated with the noninflammable, nontoxic and noninjurious sealant, no evidence of it remains visible once it has been washed in cold water.

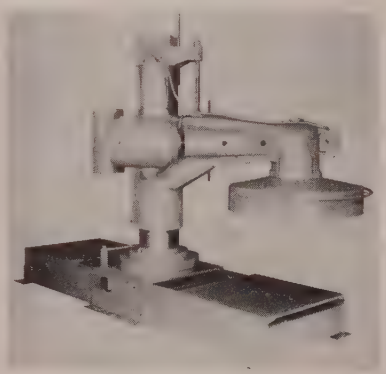
Mounting Withstands Heat

Able to function efficiently at temperatures from −80 to +250° F is the Temproof vibration control mounting announced by Lord Manufacturing Co., Erie, Pa. Designed for use for government specification JAN-C-172A equipment, the mountings have designed in friction dampers to prevent excessive equipment motion at resonant frequencies.

Mounting drift is reduced to a negligible amount, eliminating the tendency of equipment to sag or droop after long periods of service. They function efficiently over a wide range of loadings, making it practical to standardize upon one mounting for several types of equipment.

Grinders for Intricate Cores

Dual-type core grinders for fast vibrationless performance on a variety of core grinding operations are announced by Milwaukee Foundry



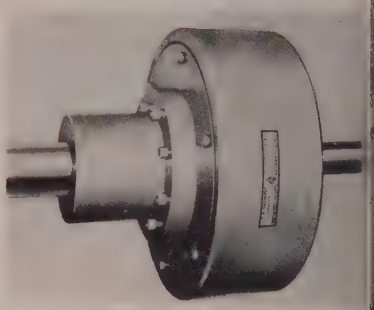
Equipment Division, Spo Inc., 6494 Grand Division Ave., Cleveland 25, O. Column, grinding wheel and drive shaft are mounted on dustproof, precision ball bearings.

Series No. 71 dual-type units make possible grinding of large cores at one grinding station while the second station is being unloaded and reloaded. The 42-inch grinding wheel has a 38-inch effective cutting diameter. Adjustable wheel arm swin progressively around a complete ci cle to accommodate existing co handling systems at either one of t two grinding stations. Wheel heig above table ranges from 15 to inches. Grinding wheel operates 242 rpm.

Heavy Equipment Clutch-Couplin

Centric Clutch Co., 22 South Av West, Cranford, N. J., is producin the Rawson centrifugal clutch cou ling for use with heavy equipment a built to permit vertical lift from t mounting of either driver or driv equipment without disturbing eith member.

Driving spider slides back over t driving hub far enough to clear t

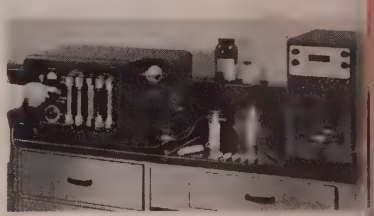


driven half of the coupling, thus pe mitting either member to be lift clear of the other. Units are ava able for either Rawson coupli standard shoes or spring-controll shoes. They're offered in nine siz ranging from 2 x 6 to 8 x 24 inch

Saves Determination Time

Up to three-quarters of the ti required for making carbon-in-st determinations is saved by an indu tion carbon apparatus developed Fisher Scientific Co., 717 Forbes S Pittsburgh 19, Pa. Only extern equipment required is a cylinder oxygen, the CO_2 absorption bulb a the balance. Carbon determinatio can be made in 2½ minutes.

Apparatus employs a quartz samp holder and an induction type coil f heating the sample with radio f



quency energy. Ignition takes pla within 2 minutes; assembly also

Season's Greetings to all...

and to all, Service Plus!

● "I'm the United States Steel Supply representative who visited or phoned you during 1950. May I say 'Thank you' for receiving me so courteously, and wish you the very best of personal joy and business success during the coming year.

"1951 is going to put service to a severe test. Limitations which are industry-wide and beyond our control, will definitely effect service on critical steel products. Rest assured that reliable steel suppliers will not make rash promises that cannot be fulfilled.

"My full-time job during 1951 will be to serve you in every way possible. I will do my best to supply you with the steel you need, offer you substitutes when they are practical, and place at your disposal the services of our product technicians and metallurgical division.

"In other words, when you need help in 1951, I'm your man. I hope you will use me."

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Refractory Porcelain Specialties in stock or designed to meet specific needs. Flasks, retorts, crucibles, etc. and parts "custom-made" to do the job.

for Carbon and Sulphur Determinations

Precision made in every detail, McDanel High Temperature Porcelain Combustion Tubes have been favorites in America's metallurgical laboratories since 1919. Made of a highly refractory porcelain body and recommended for 2900°F. service, McDanel Tubes give maximum resistance to thermal shock. Their long life keeps control costs at rock bottom.

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McDANEL REFRACTORY PORCELAIN CO.
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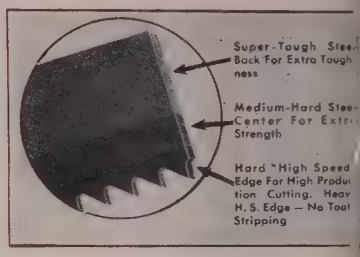
cludes a platinum wire catalyst f converting CO into CO_2. Carb dioxide formed by ignition pass through an absorber to remove S then is absorbed in the carbon dioxi absorbent. Unit is designed to han full factor weight of 2.727 grams.

Shatterproof Hacksaw Blades

Hardness, toughness and inabil to shatter are welded into a pow hacksaw blade being introduced L. S. Starrett Co., Athol, Mass. hard, high speed steel cutting ed


Super-Tough Steel Back For Extra Toughness
Medium-Hard Steel Center For Extra Strength
Hard "High Speed Edge For High Production Cutting. Heav H. S. Edge — No Tooth Stripping

is integrally welded to a medium ha extra strong steel center; this is we ed to a rough steel back, result in a blade with high impact res ance.

Hardness at the cutting edge sures straight cuts and elimina tooth stripping. Sustained cutting tough materials is possible with blade. The Safe-Flex blades are m in all standard power hacksaw si and with four, six or ten teeth inch.

• • •

EMPTY THE BARREL: A new b bushing barrel pump, made by G eral Scientific Equipment Co., Ph delphia 32, Pa., drops into the d opening and securely holds pump drum. It fits snug around tube prevents foreign matter from en ing drum. The No. 444 pull t pump fits 1½ and 2-inch openi on 15 to 55-gallon drums.

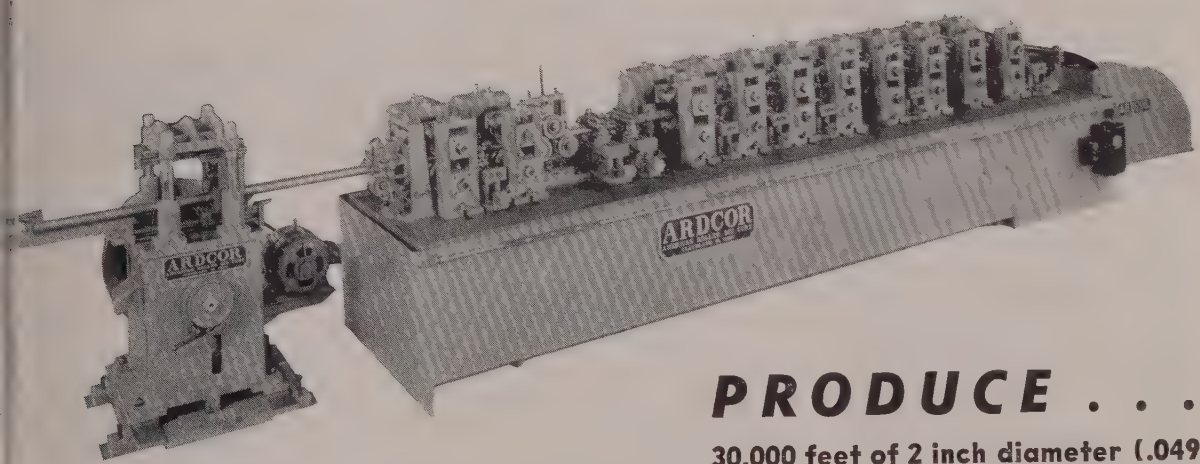
CRAYON ON METAL: Cray new washable marking crayons can be used on metal, glass and w are available from Celco Corp., S Monica, Calif. They are avail in eight colors—green, yellow, br terra cotta, black, blue, red and p ple.

NO INTERNAL PARTS: Employ the "pin-jet" impingement princ the new gallonage nozzles made Bete Fog Nozzle Inc., Greenf Mass., have no internal parts

ARDCOR

Model 1-½ F

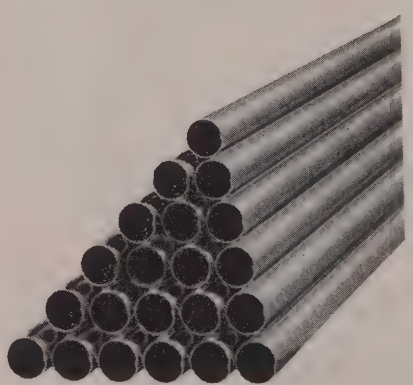
LOCK SEAM TUBE MILLS



PRODUCE . . .

30,000 feet of 2 inch diameter (.049 wall) lock seam tubing per 8 hour working day!

ESSENTIAL FOR HIGH SPEED PRODUCTION OF LOW COST LOCK SEAM TUBING



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cannot clog with foreign particles smaller than the orifice size. Nozzles are made in 10 orifice sizes from 0.015 to 0.080-inch diameter with flow rates from 1 to 100 gallons per hour.

PACKING GLAND: Pemaco E-Z-Pak gland, a self-contained packing gland, is introduced by Petch Mfg. Co., Mt. Clemens, Mich. It is designed to comply with J. I. C. standards, combines bearing surface, a low friction ram seal and and seal guard ram scraper into a single compact surface. It is made for both hydraulic and air cylinders.

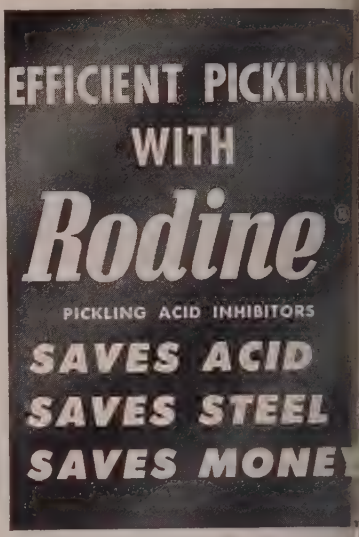
EASIER MEASURING: A new line of outside micrometer calipers, offered by Brown & Sharpe Mfg. Co., Providence 1, R. I., makes precision measuring easier, accuracy surer and micrometers longer lived. Improvements include carbide measuring faces, large diameter thimble with wide spaced divisions for easy reading and one-piece stainless steel spindle and screw.

FOR SAFETY: For positive safety in hazardous, explosive locations, Panalarm Products Inc., Chicago 26, Ill., has developed a mercury switch with either pushbutton or selector knob. Unit consists of a hermetically sealed mercury switch mounted on a lever operated armature.

FRACTIONAL HP MOTOR: Cyclohm Motor Corp. Div. of Howard Industries Inc., Racine, Wis., announces fractional horsepower motor, model 2900, is being made as a 2-speed hysteresis motor for use in tape recording appliances. It is also available as nonsynchronous capacitor motors and torque motor with high resistance rotors.

BETTER BITE: Two new flare nut wrenches that increase the range of the tools to 1⅛ inches are announced by Owatonna Tool Co., Owatonna, Minn. They are made with hex openings to provide a better bite and prevent turning the comers on soft brass nuts on copper lines.

CONTROL VALVES: Open-center, double spool-type valves in 3-way, 4-way or combination styles are offered by Parker Appliance Co. Cleveland 12, O. Sturdily constructed for heavy duty service on materials han-



Use "RODINE" for improved pickling and increased production

"RODINE" meets Government Specification No. U.S.N. 51-I-2.

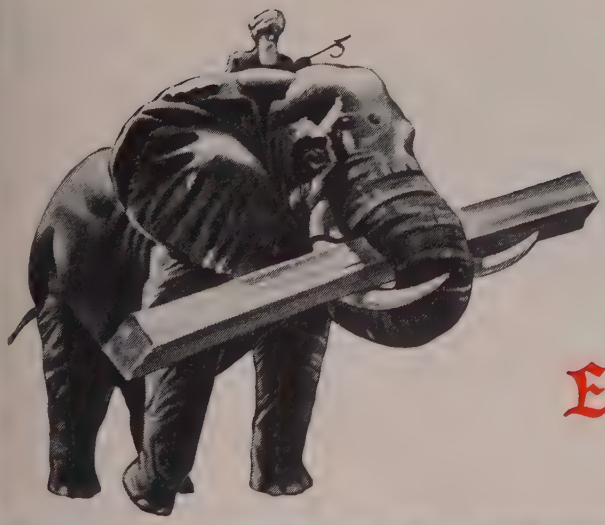
For Improved Drawing and Cold Forming

"Granodraw" forms on pickled surfaces a tightly bound adherent, zinc-iron phosphate coating which facilitates the cold extrusion of steel, improves drawing, and lengthens die life.

"Cuprodine" coats both carbon and stainless steels with a thin, bright, adherent layer of copper. This coating prolongs die life and improves the drawing of wire, rod and tube.

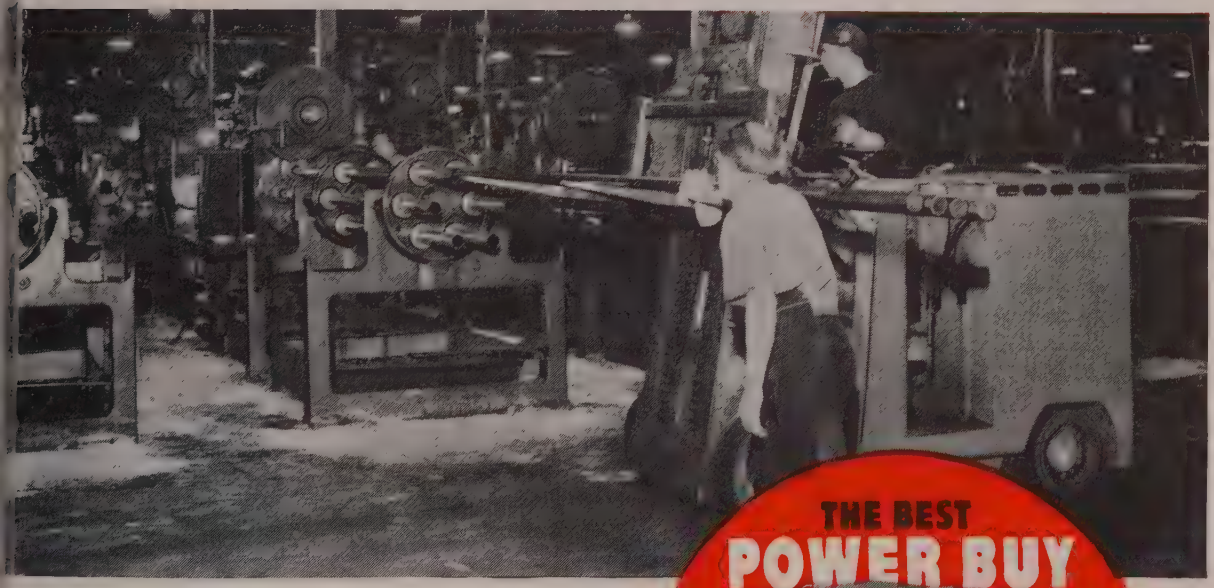
Write for Descriptive Folder

American Chemical Paint Co.
AMBLER ACP PENNA.



IT COSTS $5.50 A DAY TO FEED AN ELEPHANT... ONLY 34 CENTS TO "FEED" AN

Exide-Ironclad BATTERY



Thirty-four cents a day pays the full power cost of an Exide-Ironclad battery-powered industrial truck. Lifting, hauling and tiering all day long, it handles more tonnage than a herd of husky tuskers could move in equal time.

But low power cost is only part of the Exide story. In addition, Exide-Ironclad Batteries bring you these important benefits.

INSTANT SURGE OF POWER, plus finger-tip control, split-second handling, easy maneuvering, accurate spotting.
ROUND-THE-CLOCK PERFORMANCE—no mechanical troubles, no unscheduled down time.
UNIFORM SPEED straight through to end of shift.
LOW MAINTENANCE COSTS—seldom more than 15 cents per shift.
EXCEPTIONALLY LONG LIFE—proved on more than 100,000 heavy-duty jobs.
INHERENT SAFETY—no vibration to jar goods in transit, less worker fatigue and accident hazards.

There are Exide-Ironclad Batteries for every size and make of battery electric truck.

Write for more facts and FREE copy of Exide-Ironclad Topics. It contains latest developments in materials handling . . . shows actual case histories.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto
"Exide-Ironclad" *Reg. Trade-mark U.S. Pat. Off*

888 . . . DEPENDABLE BATTERIES FOR 63 YEARS . . . 1951

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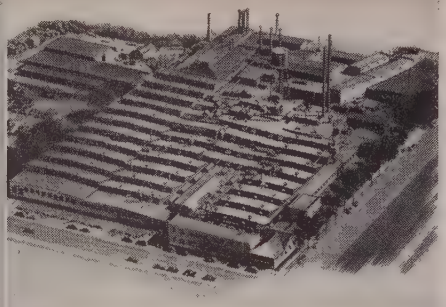
HEAVY-DUTY
Air-Cooled
ENGINES



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Single Cyl.
3 to 9 hp.

4-cycle
2-Cyl.
7 to 13 hp.

V-type
4-Cyl.
15 to 30 hp.

As a potential or present user of internal combustion engines, you will readily recognize the advantages of dealing with an outstanding leader in this field.

Because constant engineering effort and manufacturing skill are applied entirely to the improvement and large volume production of WISCONSIN HEAVY-DUTY AIR-COOLED ENGINES, in a complete, all-purpose power range, you have the best assurance not only of dependable power units ideally suited to your power applications but, of equal importance . . . you have, here, the world's most dependable source of supply both for engines and original factory parts.

Supporting this endeavor are key distributors of impressive recognition in the territories they serve, and a staff of competent Wisconsin Motor Corporation field men, in close liaison between factory and customer. Your best interests are our primary interest.

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World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

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800 to 2000 F.

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RETAINS ITS CLEAN, LEGIBLE MARK AFTER METAL HAS COOLED.

the AMERICAN CRAYON company Sandusky, Ohio
NEW YORK · SAN FRANCISCO · DALLAS

dling machines, valves may be used for either single or double acting cylinders which are not required to operate at the same time. Operating at pressures up to 2000 psi, they feature an externally, adjustable, built-in, balanced seatless relief valve.

FLEXIBLE COUPLINGS: A new series of flexible couplings, developed by Lord Mfg. Co., Erie, Pa., are for use with motor-driven equipment which requires the use of electrical motors with ratings up to ½-hp at 1750 rpm. Coupling design reduces operating noise, absorbs torsional shaft vibration and accommodates shaft misalignments of as much as 2 degrees angular and 1/32-inch parallel.

FLOW TRANSMITTER: Known as V/A cell, a new, precision flow transmitter has been developed by Fischer & Porter Co., Hatboro, Pa., for differential pressure applications. It is applicable to services on liquids, gas and vapor streams including steam. Basically a through-flow instrument of the variable-area type, it measures a by-passed portion of the main line flow.

NO SUPPORT NEEDED: Coolant spouts that stay put without any support and are adjustable to any position by the touch of the hand are available from J. N. Fauver Co. Inc., Detroit 1, Mich. Designated as Bullseye, the spouts will stay in place continuously regardless of the machine vibration or volume of coolant flow.

DUAL GAS BURNERS: Meyer Furnace Co., Peoria, Ill., is manufacturing a dual gas burner for use with almost all Weir-Meyer gas furnaces. Furnace is equipped with an outside thermostat, installed in the circuit, which will automatically change from natural to propane gas, or vise versa, in accordance with the outside temperature and depending on temperature for which thermostat has been set.

FOR MORE INFORMATION

on the new products and equipment in this section write to Readers' Service Dept., STEEL, Penton Bldg., Cleveland 13, O. It will receive prompt attention.

The Market Outlook

STEEL and metalworking industries enter the new year prepared to make far-reaching changes. But uncertainties attending development of governmental policies controlling the economy for duration of the emergency prevent clear-cut appraisal of the outlook, especially for the near-term future. This is notably true as regards prices and priorities. While weeks of confusion lie ahead it is evident that from here on the various government emergency agencies will move faster and much more realistically in converting to a defense economy.

CONTROLS—More controls are on the way, and soon. But just what final form these will take remains to be determined. In general, they probably will be fashioned pretty much after World War II patterns. Fortunately, the shortcomings of various regulatory measures effected to date now are more fully realized in Washington. Consequently, under increasing pressure of the emergency, and with a more capable defense organization being rapidly created, acceleration of sounder economic control policies may be expected. Actually much spade work already has been done. Further, scope of military requirements is becoming more clarified so that defense authorities should be able to move ahead much more quickly and constructively.

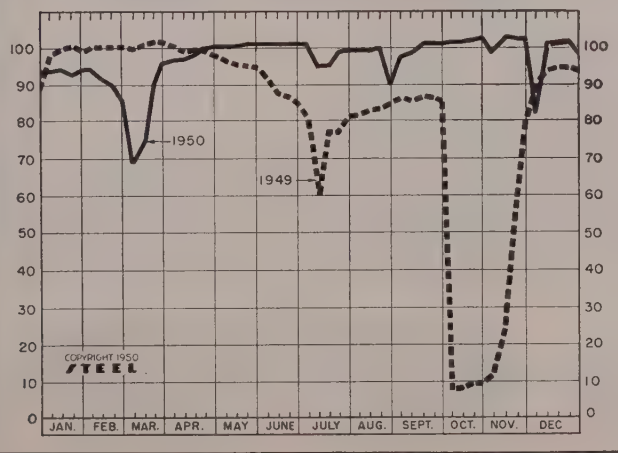
SUPPLY—With an increasing volume of rated tonnage coming out, the steel supply squeeze on the general consuming trade is becoming more pronounced. February allocations to non-rated requirements are off sharply from preceding months, and March quotas will be still smaller. This trend is likely to continue through the first half of the year even though larger production of steel is indicated than in 1950. Rated requirements of hot-rolled carbon bars have not kept pace with similar needs of other major products. But this situation can shift quickly once demand for shells, combat tanks and other military needs develops in the volume predicted. In the light, flat-rolled products some producers already are supplying more than minimum quotas set up for DO and other rated orders. This is restricting commercial supplies to the point some consumers anticipate early curtailment of operations unless they can secure defense work.

PRICES—At the turn of the year finished steel prices appear well established at the higher levels effected early in December. But a note of uncertainty prevails in the trade as to the status of current schedules under the voluntary rollback policy of the Economic Stabilization Agency. Some steelmakers did not take price action until after Dec. 1, the rollback date. Whether mandatory rollbacks will be ordered in steel is unknown, but the fact that the stabilization authorities have requested steelmakers to submit their prices of record June 15 and Dec. 15, 1950, is considered significant.

COMPOSITES—STEEL's weighted index of finished steel prices held unchanged at 167.67 last week, comparing with 157.76 the preceding month, and 156.83 a year ago. The arithmetical composite also was steady at $103.50 against $95.09 one month ago and $92.09 last year at this season. Steelmaking scrap composite also is unchanged at $45.50. A month ago it was $41 and a year ago $27.25. Some clarification of the price outlook for scrap is expected following a meeting Jan. 2 of government officials with scrap buyers and sellers.

PRODUCTION—Holiday observance reduced steelmaking operations slightly. The national ingot rate last wek was estimated to average 98 per cent of capacity, off 3.5 points from the rate in effect prior to Christmas.

NATIONAL STEELWORKS OPERATIONS

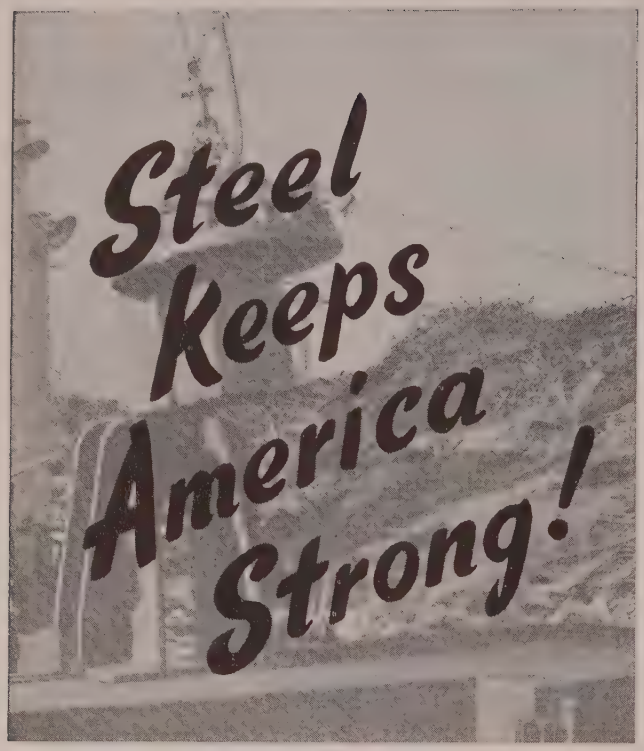


DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Dec. 30	Change	Same Week 1949	Same Week 1948
Pittsburgh	102	+ 0.5*	96.5	94.5
Chicago	105	+ 5.5*	96	99
Eastern Pa.	91	— 7	78	83.5
Youngstown	106	+ 1	102	105
Wheeling	97	— 3.5	96.5	92.5
Cleveland	96	— 6.5*	95.5	96
Buffalo	104	0	103.5	104
Birmingham	100	0	100	100
New England	89	+ 4	81	86
Cincinnati	88	—14	104	99
St. Louis	95	0	84.5	77.5
Detroit	102	0*	98	99
Western	101	— 4.5	87	..
Estimated national rate	98	— 3.5	93.5	97.5

Based on weekly steelmaking capacity of 1,906,268 net tons for first half and 1,928,721 second half, 1950; 1,843,516 tons for 1949; 1,802,476 net tons for 1948. *Change from revised rate.

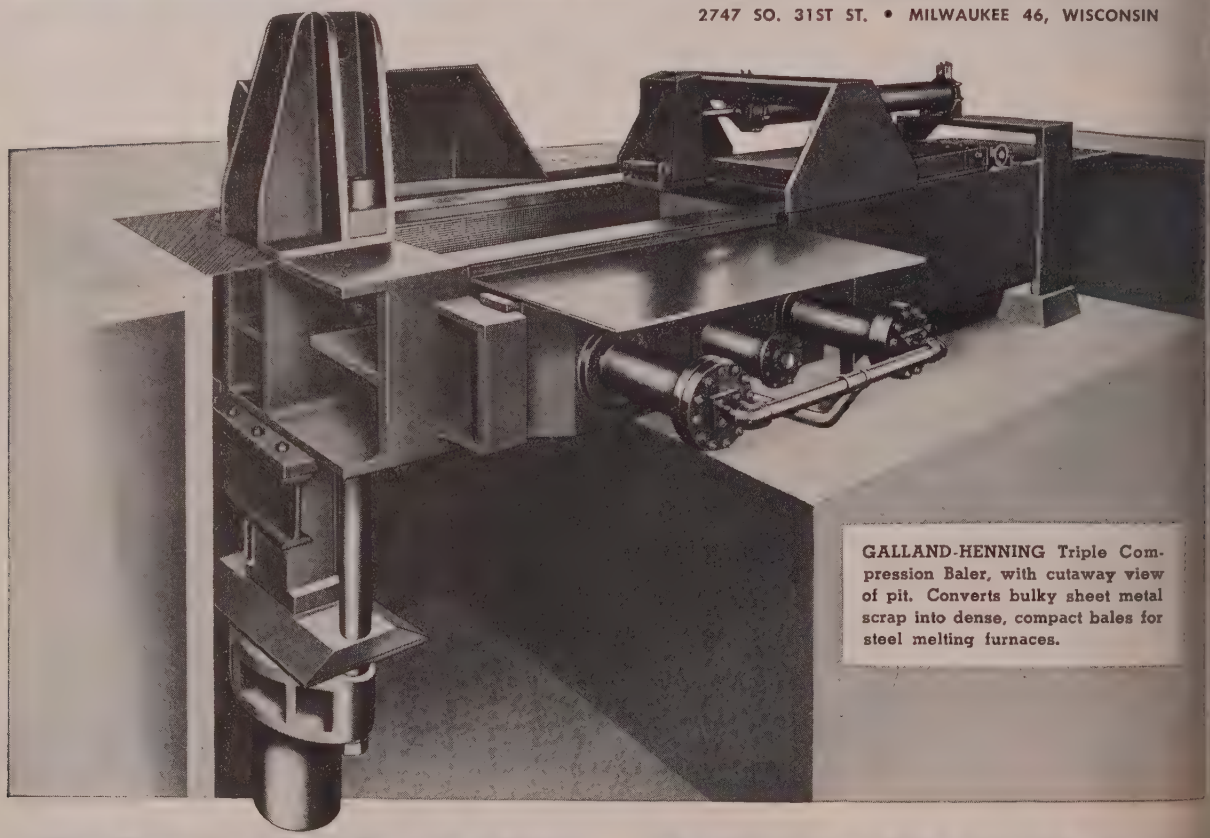


. . . and Baled Sheet Metal Scrap Helps Keep Steel Production at a High Level

If you are not baling your sheet metal scrap, perhaps you should be . . . not only for the immediate benefit to your own operation . . . but in the interest of a strong industrial economy. More and more steel is needed for its continued strength and growth.

If you question the advisability of baling your sheet metal scrap, competent counsel is available without cost or obligation. Galland-Henning engineers offer you the benefit of many years' experience in all types of scrap metal baling . . . and in the design, construction and installation of powerful, efficient baling equipment which assures lowest possible cost-per-ton.

GALLAND-HENNING MFG. CO.
2747 SO. 31ST ST. • MILWAUKEE 46, WISCONSIN



GALLAND-HENNING Triple Compression Baler, with cutaway view of pit. Converts bulky sheet metal scrap into dense, compact bales for steel melting furnaces.

GALLAND-HENNING
SCRAP METAL BALING PRESSES

A 5840-1P

Composite Market Averages

	Dec. 28 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
ED STEEL INDEX, Weighted:					
(1935-39 av.=100)..	167.67	167.67	157.76	156.83	101.87
in cents per lb.	4.545	4.545	4.274	4.249	2.760
METICAL PRICE COMPOSITES:					
ed Steel, NT	$103.50	$103.50	$95.09	$92.09	$58.27
Fdry, Pig Iron, GT..	52.54	52.54	49.54	46.10	25.42
Pig Iron, GT	52.16	52.16	49.04	45.60	24.75
able Pig Iron, GT....	53.27	53.27	50.27	47.27	26.04
aking Scrap, GT ...	45.50	45.50	41.00	27.25	19.17

ghted finished steel index based on average shipments and Pitts- district prices of the following 14 representative products during base period 1935-39. Structural shapes, plates, rails, hot-rolled old-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled , galvanized sheets, hot and cold-rolled strip. For complete ex- ion see STEEL, Sept. 19, 1949, p. 54.

hmetical steel price composite based on same products as the ted finished steel index with the exception of rails, cold-finished galvanized sheets and hot-rolled strip.

lo and No. 2 foundry pig iron composites are based on average at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleve- Granite City, Youngstown. Malleable composite based on same , except Birmingham.

olmaking scrap composite based on average prices of No. 1 heavy ng steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

parative prices by districts, in cents per pound except as other- noted. Delivered prices based on nearest production point.

SHED MATERIALS

	Dec. 28 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
H.R., Pittsburgh....	3.70	3.70	3.45	3.45	2.25
H.R., Chicago	3.70	3.70	3.45	3.45	2.25
H.R., del. Philadelphia	4.18	4.18	3.93	3.93	2.57
C.F., Pittsburgh....	4.55	4.55	4.15	4.10–15	2.75
s, Std., Pittsburgh ..	3.65	3.65	3.40	3.40	2.10
s, Std., Chicago	3.65	3.65	3.40	3.40	2.10
s, del. Philadelphia..	3.90	3.90	3.46	3.46	2.215
s, Pittsburgh	3.70	3.70	3.50	3.50	2.25
s, Chicago	3.70	3.70	3.50	3.50	2.25
s, Coatesville, Pa. ...	4.15	4.15	3.90	3.60	2.25
s, Sparrows Point, Md.	3.70	3.70	3.50	3.50	2.25
s, Claymont, Del. ...	4.15	4.15	3.90	3.60	2.25
s, H.R., Pittsburgh..	3.60–75	3.60–75	3.35	3.35	2.20
s, H.R., Chicago	3.60	3.60	3.35	3.35	2.20
s, C.R., Pittsburgh ..	4.35	4.35	4.10	4.10	3.05
s, C.R., Chicago	4.35	4.35	4.10	4.00	3.05
s, C.R., Detroit	4.30	4.30	4.30	4.20	3.15
t, Galv., Pittsburgh..	4.80	4.80	4.40	4.40	3.70
H.R., Pittsburgh....	3.75–4.00	3.75–4.00	3.50–75	3.25	2.10
H.R., Chicago	3.50	3.50	3.25	3.25	2.10
C.R., Pittsburgh	4.65–5.25	4.65–5.25	4.15–4.85	4.15	2.80
C.R., Chicago.....	4.50–90	4.50–90	4.30	4.00–15	2.90
C.R., Detroit	4.35–5.60	4.35–5.60	4.35–5.10	4.20–40	2.90
Basic, Pittsburgh ..	4.85–5.10	4.85–5.10	4.50–75	4.50	2.75
Wire, Pittsburgh....	5.90–6.20	5.90–6.20	5.30–60	5.30	2.90
plate, box, Pittsburgh.	$7.50	$7.50	$7.50	$7.75	$5.00

IFINISHED

s, forging, Pitts. (NT)	$66.00	$66.00	$63.00	$63.00	$42.00
rods, 7/32-⅜", Pitts....	4.10–30	4.10–30	3.85	3.85	2.15

IRON, Gross Ton

mer, Pitts.	$53.00	$53.00	$50.00	$47.00	$26.25
, Valley	52.00	52.00	49.00	46.00	25.25
, del. Phila.	56.39	56.39	53.39	49.44	27.09
2 Fdry, Pitts.	52.50	52.50	49.50	46.50	25.75
2 Fdry, Chicago	52.50	52.50	49.50	46.50	25.75
2 Fdry, Valley	52.50	52.50	49.50	46.50	25.75
2 Fdry, Del. Phila. ...	56.89	56.89	53.89	49.94	27.59
2 Fdry, Birm.	48.88	48.88	45.88	39.38	22.13
2 Fdry (Birm.) del. Cin.	55.58	55.58	52.58	46.08	25.81
sable Valley	52.50	52.50	49.50	46.50	25.75
sable, Chicago	52.50	52.50	49.50	46.50	25.75
coal, Lyles, Tenn.	66.00	66.00	62.00	60.00	33.00
manganese, Etna, Pa.	188.00	188.00	175.00	175.00	140.00*

Delivered, Pittsburgh.

AP, Gross Ton

1 Heavy Melt. Pitts...	$46.50	$46.50	$44.00	$30.00	$20.00
1 Heavy Melt. E. Pa..	45.00	45.00	39.00	23.75	18.75
1 Heavy Melt. Chicago	45.00	45.00	40.00	27.00	18.75
1 Heavy Melt. Valley.	46.25	46.25	43.75	30.25	20.00
1 Heavy Met. Cleve...	45.75	45.75	43.25	27.25	19.50
1 Heavy Melt. Buffalo.	44.88	44.88	41.50	29.75	19.25
, Rerolling, Chicago..	67.00	67.00	64.50	41.50	22.25
1 Cast, Chicago	63.00	63.00	59.00	38.50	20.00

(E, Net Ton

ive, Furn., Connlsvl...	$14.75	$14.75	$14.25	$13.25	$7.50
ive, Fdry., Connlsvl...	17.50	17.50	16.50	15.50	8.25
Fdry., Chicago	21.00	21.00	21.00	20.00	13.00

NFERROUS METALS

per, del. Conn.	24.50	24.50	24.50	18.50	12.00
, E. St. Louis	17.50	17.50	17.50	9.75	8.25
, St. Louis	16.80	16.80	16.80	11.80	6.35
New York	150.00	146.00	144.00	78.00	52.00
minum, del.	19.00	19.00	19.00	17.00	15.00
mony, Laredo, Tex. ..	32.00	32.00	32.00	32.00	14.50
tel, refinery, duty paid.	50.50	50.50	48.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malle- able	Besse- mer
Bethlehem,Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn,N.Y.,del.	....	58.79	59.29	....
Newark,del.	56.63	57.13	57.63	58.13
Philadelphia,del.	56.39	56.89	57.39	57.89
Birmingham District				
AlabamaCity,Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward,Ala. W15	48.38	48.88	....	....
Cincinnati,del.	....	55.58	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda,N.Y., W12	52.00	52.50	53.00	....
No.Tonawanda,N.Y., T9	....	52.50	53.00	....
Boston,del.	61.26	61.76	62.20	....
Rochester,N.Y.,del.	54.63	55.13	55.63	....
Syracuse,N.Y.,del.	55.58	56.08	56.58	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary,Ind. C3	52.00	....	52.50	....
IndianaHarbor,Ind. I-2	52.00	....	52.50	....
So.Chicago,Ill. W14	52.00	52.50	52.50	....
So.Chicago,Ill., Y1	52.00	52.50	52.50	....
So.Chicago,Ill. C3	52.00	....	52.50	53.00
Milwaukee,del.	53.89	54.39	54.39	54.89
Muskegon,Mich.,del.	....	57.98	57.98	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.39	54.89	54.89	54.39
Lorain,O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie,Pa. I-3	52.00	52.50	52.50	53.00
Everett,Mass. E1	....	53.25	53.75	....
Fontana,Calif. K1	58.00	58.50	....	....
Geneva,Utah G1	52.00	52.50	....	....
Seattle,Tacoma,Wash.,del.	....	60.20	....	....
Portland,Oreg.,del.	....	60.20	....	....
LosAngeles,SanFrancisco,del.	59.70	60.20	....	....
GraniteCity,Ill. M10	53.90	54.40	54.90	....
St.Louis,del. (inc. tax)	54.65	55.15	55.65	....
Ironton,Utah C11	52.00	52.50	....	....
LoneStar,Tex. L6	48.00	*48.50	48.50	....
Minnequa,Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
Nevillelsland,Pa. P6	....	52.50	52.50	53.00
Pitts.,N&S. sides, Ambridge, Aliquippa, del.	....	53.69	53.69	54.19
McKeesRocks,del.	....	53.45	53.45	53.95
Lawrenceville,Homestead, McKeesport,Monaca,del	....	53.94	53.94	54.44
Verona,del.	....	54.40	54.40	54.90
Brackenridge,del.	....	54.63	54.63	55.13
Bessemer,Pa. C3	52.00	....	52.50	53.00
Clairton,Rankin,So.Duquesne,Pa. C3	52.00	....	....	....
McKeesport,Pa. N3	52.00	....	....	53.00
Monessen,Pa. P7	54.00	....	....	....
Sharpsville,Pa. S6	....	....	52.50	53.00
Steelton,Pa. B2	54.00	54.50	55.00	55.50
Swedeland,Pa. A3	56.00	56.50	57.00	57.50
Toledo,O. I-3	52.00	52.50	52.50	53.00
Cincinnati,del.	57.01	57.51	....	....
Troy,N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard,O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Mansfield,O.,del.	56.26	56.76	56.76	57.26

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-3.5%

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson,O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls,N.Y. P15	$83.00
Keokuk,Iowa, Openhearth & Fdry, frt, allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb. piglets, 16% Si, frt. allowed K2	95.50
Wenatchee,Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos. semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton,Pa. B2	60.00
Philadelphia delivered	63.00
Troy,N.Y. R2	60.00

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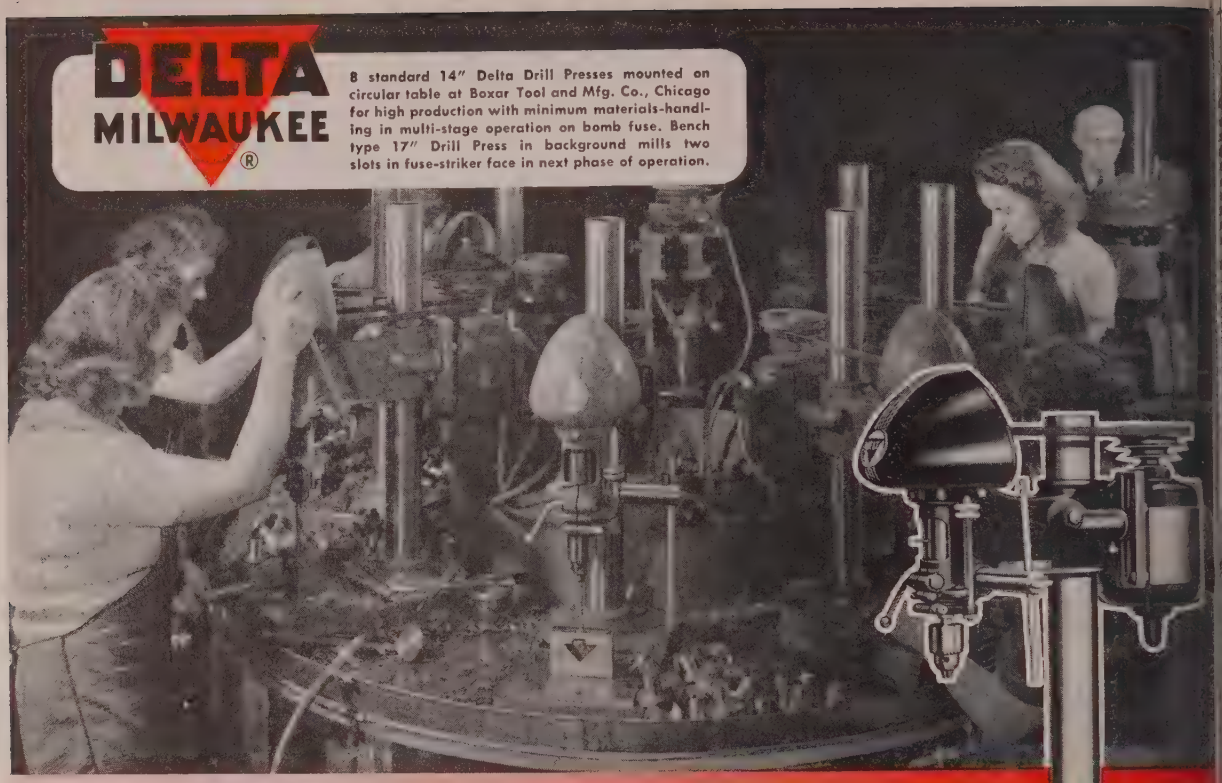

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Name.....

Title.....

Company.....

Address.....

City.....( ) State.....

M-52

Semifinished and Finished Steel Products

Mill prices as reported to STEEL Dec. 28, 1950; cents per pound except as otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

TS, Carbon, Forging (NT)
na,Calif. K1 ....$76.00
all,Pa. C3 ....52.00

TS, Alloy (NT)
at R7 ....$54.00
na,Calif. K1 ....80.00
on,Tex. S5 ....62.00
nd,Pa. C18 ....54.00
all,Pa. C3 ....54.00
quesne,Pa. C3 ...54.00

TS, BLOOMS & Slabs

arbon, Rerolling (NT)
mer,Pa. C3 ....$56.00
on,Pa. C3 ....56.00
y,Ala. T2 ....56.00
eld,Ala. T2 ....56.00
na,Calif. K1 ....75.00
Ind. C3 ....56.00
town,Pa. B2 ....56.00
awanna,N.Y. B2 ..56.00
all,Pa. C3 ....56.00
icago,Ill. C3 ....56.00
quesne,Pa. C3 ...56.00

Carbon, Forging (NT)
mer,Pa. C3 ....$66.00
lo R2 ....66.00
on,O. R2 ....66.00
on,Pa. C3 ....66.00
land R2 ....66.00
hohocken,Pa. A3 ..73.00
it R7 ....69.00
y,Ala. T2 ....66.00
eld,Ala. T2 ....66.00
na,Calif. K1 ....85.00
,Ind. C3 ....66.00
a,Utah G1 ....66.00
ton,Tex. S5 ....74.00
stown,Pa. B2 ....66.00
awanna,N.Y. B2 ..66.00
ngeles B3 ....85.00
all,Pa. C3 ....66.00
le B3 ....85.00
icago C3, R2 ...66.00
icago W14 ....63.00
quesne,Pa. C3 ...66.00
nFrancisco B3 ...85.00

Alloy, Forging (NT)
lehem,Pa. B2 ....$70.00
lo R2 ....70.00
on,O. R2 ....70.00
on,O.(29) T7 ....66.00
hohocken,Pa. A3 ..77.00
it R7 ....73.00
na,Calif. K1 ....89.00
,Ind. C3 ....70.00
ton,Tex. S5 ....78.00
Harbor,Ind. Y1 ...66.00
stown,Pa. B2 ....70.00
awanna,N.Y. B2 ..70.00
Angeles B3 ....90.00
illon,O. R2 ....70.00
and,Pa. C18 ....70.00
hall,Pa. C3 ....70.00
hicago C3, R2 ...70.00
hicago W14 ....66.00
quesne,Pa. C3 ...70.00
ren,O. C17 ....70.00

NDS, SEAMLESS TUBE (NT)
on,O. R2 ....$82.00
eland R2 ....82.00
ana,Calif. K1 ....103.00
,Ind. C3 ....82.00
illon,O. R2 ....82.00
hicago,Ill. R2 ....82.00
quesne,Pa. C3 ...82.00

T BARS (NT)
ana,Calif. K1 ....$89.00

P
uippa,Pa. J5 ....3.45
hall,Pa. C3 ....3.35
ren,O. R2 ....3.35
ngstown C3, R2 ...3.35

E RODS
oamaCity,Ala. R2 ..4.10
alo W12 ....4.10
eland A7 ....4.10
ora,Pa. A7 ....4.10
field,Ala. T2 ....4.10
ana,Calif. K1 ....4.90
aston,Tex. S5 ....4.50
stown,Pa. B2 ....4.10
t,Ill. A7 ....4.10
Angeles B3 ....4.90
nequa,Colo. C10 ...4.35
essen,Pa. P7 ....4.30
Tonawanda,N.Y. B11 4.10
sburg,Calif. C11 ...4.75
smouth,O. P12 ....4.30
bling,N.J. R5 ....4.20
Chicago,Ill. R2 ....4.10
rrowsPoint,Md. B2 ..4.20
ling,Ill.(1) N15 ....4.10
thers,O. Y1 ....4.10
rance,Calif. C11 ....4.90
ycester A7 ....4.40

STRUCTURALS

Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 ....3.65
Bessemer,Ala. T2 ....3.65
Bethlehem,Pa. B2 ....3.70
Clairton,Pa. C3 ....3.65
Fairfield,Ala. T2 ....3.65
Fontana,Calif. K1 ....4.25
Gary,Ind. C3 ....3.65
Geneva,Utah G1 ....3.65
Houston,Tex. S5 ....4.05
Ind.Harbor,Ind. I-2 ...3.65
Johnstown,Pa. B2 ....3.70
KansasCity,Mo. S5 ....4.25
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 ....4.25
Minnequa,Colo. C10 ...4.10
Munhall,Pa. C3 ....3.65
Niles,Calif.(22) P1 ....4.85
Phoenixville,Pa. P4 ....4.95
Portland,Oreg. O4 ....4.50
Seattle B3 ....4.30
So.Chicago,Ill. C3, W14.3.65
So.SanFrancisco B3 ...4.20
Torrance,Calif. C11 ...4.25
Weirton,W.Va. W6 ....3.90

Alloy Stand. Shapes
Clairton,Pa. C3 ....4.35
Fontana,Calif. K1 ....5.55
Munhall,Pa. C3 ....4.35
So.Chicago,Ill. C3 ....4.35

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 ....5.50
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa.(14) B2 ..5.50
Clairton,Pa. C3 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.10
Gary,Ind. C3 ....5.50
Geneva,Utah G1 ....5.50
Ind.Harbor,Ind. I-2 ...5.50
Ind.Harbor,Ind. Y1 ...6.00
Johnstown,Pa. B2 ....5.50
Lackawanna,N.Y.(14)B2 5.50
LosAngeles B3 ....6.05
Munhall,Pa. C3 ....5.50
Seattle B3 ....6.10
So.Chicago,Ill. C3 ....5.50
So.SanFrancisco B3 ...6.00
Struthers,O. Y1 ....6.00

Wide Flange
Bethlehem,Pa. B2 ....3.70
Fontana,Calif. K1 ....4.65
Lackawanna,N.Y. B2 ..3.70
Munhall,Pa. C3 ....3.65
So.Chicago,Ill. C3 ....3.65

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 ....5.50
Lackawanna,N.Y. B2 ..5.50
Munhall,Pa. C3 ....5.45
So.Chicago,Ill. C3 ....5.45

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ....4.45
Lackawanna,N.Y. B2 ..4.45
Munhall,Pa. C3 ....4.45
So.Chicago,Ill. C3 ....4.45

BEARING PILES
Munhall,Pa. C3 ....3.65
So.Chicago,Ill. C3 ....3.65

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 ....5.65
Bessemer,Ala. T2 ....5.65
Clairton,Pa. C3 ....5.65
Cleveland J5, R2 ....5.65
Conshohocken,Pa. A3 ..5.90
Ecorse,Mich. G5 ....5.85
Fairfield,Ala. T2 ....5.65
Fontana,Calif. K1 ....6.25
Gary,Ind. C3 ....5.65
Geneva,Utah G1 ....5.65
Ind.Harbor,Ind. I-2 ...5.65
Ind.Harbor,Ind. Y1 ...6.15
Johnstown,Pa. B2 ....5.65
Munhall,Pa. C3 ....5.65
Pittsburgh J5 ....5.65
Seattle B3 ....6.55
Sharon,Pa. S3 ....5.70
So.Chicago,Ill. C3 ....5.65
SparrowsPoint,Md. B2 ..5.65
Warren,O. R2 ....5.65
Youngstown Y1 ....6.15

PLATES, Open-Hearth Alloy
Coatesville,Pa. L7 ....5.25
Conshohocken,Pa. A3 ..5.05
Fontana,Calif. K1 ....5.70
Gary,Ind. C3 ....4.75
Johnstown,Pa. B2 ....4.75
Munhall,Pa. C3 ....4.75
Sharon,Pa. S3 ....5.20
So.Chicago,Ill. C3 ....4.75
SparrowsPoint,Md. B2 ..4.75

FLOOR PLATES
Cleveland J5 ....4.75
Conshohocken,Pa. A3 ..4.75
Harrisburg,Pa. C5 ....5.95
Ind.Harbor,Ind. I-2 ...4.75
Munhall,Pa. C3 ....4.75
So.Chicago,Ill. C3 ....4.75

PLATES (Universal Mill)
Fontana,Calif. K1 ....4.65

PLATES, Carbon A.R.
Fontana,Calif. K1 ....5.45

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 ....3.70
Ashland,Ky.(15) A10 ..3.70
Bessemer,Ala. T2 ....3.70
Clairton,Pa. C3 ....3.70
Claymont,Del. W16 ....4.15
Cleveland J5, R2 ....3.70
Coatesville,Pa. L7 ....4.15
Conshohocken,Pa. A3 ..4.15
Ecorse,Mich. G5 ....3.75
Fairfield,Ala. T2 ....3.70
Fontana,Calif. K1 ....4.30
Gary,Ind. C3 ....3.70
GraniteCity,Ill. G4 ....4.40
Geneva,Utah G1 ....3.70
Harrisburg,Pa. C5 ....4.95
Houston,Tex. S5 ....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 ....3.70
Lackawanna,N.Y. B2 ..3.70
Minnequa,Colo. C10 ...4.50
Munhall,Pa. C3 ....3.70
Pittsburgh J5 ....3.70
Seattle B3 ....4.60
Sharon,Pa. S3 ....3.95
So.Chicago,Ill. C3, W14.3.70
SparrowsPoint,Md. B2 ..3.70
Steubenville,O. W10 ...3.70
Warren,O. R2 ....3.70
Weirton,W.Va. W6 ....4.00
Youngstown C3, R2, Y1.3.70

PLATES, Wrought Iron
Economy,Pa. B14 ....8.60

PLATES, Ingot Iron
Ashland,c.l.(15) A10 ..3.95
Ashland,lcl.(15) A10 ...4.45
Cleveland,c.l. R2 ....4.30
Warren,O.cl. R2 ....4.30

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 ....3.70
Alton,Ill.(1) L1 ....3.45
Atlanta,Ga. A11 ....4.25
Bessemer,Ala. T2 ....3.70
Buffalo R2 ....3.70
Canton,O. R2 ....3.70
Clairton,Pa. C3 ....3.70
Cleveland R2 ....3.70
Detroit R7 ....3.85
Ecorse,Mich. G5 ....3.65
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 ....3.70
Fontana,Calif. K1 ....4.40
Gary,Ind. C3 ....3.70
Houston,Tex. S5 ....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 ....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 ....4.40
Milton,Pa. B6 ....4.20
Minnequa,Colo. C10 ...4.15
Niles,Calif. P1 ....4.17
N.Tonawanda,N.Y. B11.3.70
Pittsburg,Calif. C11 ...4.40
Pittsburgh J5 ....3.70
Portland,Oreg. O4 ....4.65
Seattle B3, N14 ....4.45
So.Chicago C3, R2, W14.3.70
So.Duquesne,Pa. C3 ...3.70
So.SanFran.,Cal. B3 ...4.45
Struthers,O. Y1 ....3.70
Torrance,Calif. C11 ...4.40
Weirton,W.Va. W6 ....3.85
Youngstown C3, R2 ...3.70

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....3.70
Atlanta A11 ....4.25
Johnstown,Pa. B2 ....3.70
Lackawanna,N.Y. B2 ..3.70
Niles,Calif. P1 ....5.05
Portland,Oreg. O4 ....4.65
SanFrancisco S7 ....4.85

BAR SIZE ANGLES; H.R.CARBON
Bethlehem,Pa. B2 ....3.90

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ....4.30
Buffalo R2 ....4.30
Canton,O. R2 ....4.30
Canton,O.(29) T7 ....3.95
Clairton,Pa. C3 ....4.30
Detroit R7 ....4.45
Ecorse,Mich. G5 ....4.25
Fontana,Calif. K1 ....5.35
Gary,Ind. C3 ....4.30
Houston,Tex. S5 ....4.70
Ind.Harbor,Ind. I-2, Y1.4.30
Johnstown,Pa. B2 ....4.30
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.30
LosAngeles B3 ....5.35
Massillon,O. R2 ....4.30
Midland,Pa. C18 ....4.30
So.Chicago C3, R2, W14.4.30
So.Duquesne,Pa. C3 ...4.30
Struthers,O. Y1 ....4.30
Warren,O. C17 ....4.30
Youngstown C3 ....4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. C3 ....4.55
Fontana,Calif. K1 ....5.30
Gary,Ind. C3 ....4.55
Youngstown C3 ....4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ....5.55
Atlanta A11 ....5.35
Bessemer,Ala. T2 ....5.55
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. C3 ....5.55
Cleveland R2 ....5.55
Ecorse,Mich. G5 ....5.65
Fairfield,Ala. T2 ....5.55
Fontana,Calif. K1 ....6.60
Gary,Ind. C3 ....5.55
Ind.Harbor,Ind. I-2 ...5.55
IndianaHarbor,Ind. Y1..6.05
Johnstown,Pa. B2 ....5.55
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 ....6.25
Pittsburgh J5 ....5.55
Seattle B3 ....6.30
So.Duquesne,Pa. C3 ...5.55
So.SanFrancisco B3 ...6.30
Struthers,O. Y1 ....6.05
Youngstown C3 ....5.55

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....4.55
BeaverFalls,Pa.M12,R2 ..4.55
Buffalo B5 ....4.60
Camden,N.J. P13 ....5.00
Carnegie,Pa. C12 ....4.55
Chicago W18 ....4.55
Cleveland A7, C20 ....4.55
Detroit P17 ....4.70
Donora,Pa. A7 ....4.55
Ecorse,Mich. G5 ....4.35
Elyria,O. W8 ....4.55
FranklinPark,Ill. N5 ...4.55
Gary,Ind. R2 ....4.55
GreenBay,Wis. F7 ....4.55
Hammond,Ind. L2, M13.4.55
Hartford,Conn. R2 ....5.10
Harvey,Ill. B5 ....4.55
LosAngeles R2 ....6.00
Mansfield,Mass. B5 ....5.10
Massillon,O. R8 ....4.55
Midland,Pa. C18 ....4.55
Monaca,Pa. S17 ....4.55
Newark,N.J. W18 ....5.00
Plymouth,Mich. P5 ....4.80
Pittsburgh J5 ....4.55
Putnam,Conn. W18 ....5.10
Readville,Mass. C14 ....5.10
St. Louis,Mo. M5 ....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa.(5) K3 ...5.00
Struthers,O. Y1 ....4.55
Waukegan,Ill. A7 ....4.55
Youngstown F3, Y1 ....4.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....5.40
BeaverFalls,Pa. M12 ...5.40
Bethlehem,Pa. B2 ....5.40
Buffalo B5 ....5.40
Camden,N.J. P13 ....5.80
Canton,O. R2 ....5.40
Canton,O.(29) T7 ....4.90
Carnegie,Pa. C12 ....5.40
Chicago W18 ....5.40
Cleveland A7 ....5.45
Cleveland C20 ....5.40
Detroit P17 ....5.55
Donora,Pa. A7 ....5.45
Elyria,O. W8 ....5.40
Gary,Ind. R2 ....5.40
Hammond,Ind. L2, M13.5.40
Hartford,Conn. R2 ....5.85
Harvey,Ill. B5 ....5.40
Lackawanna,N.Y. B2 ..5.40
Mansfield,Mass. B5 ....5.85
Massillon,O. R2, R8 ....5.40
Midland,Pa. C18 ....5.40
Monaca,Pa. S17 ....5.40
Newark,N.J. W18 ....5.75
Plymouth,Mich. P5 ....5.60
So.Chicago,Ill. R2, W14.5.40
Struthers,O. Y1 ....5.40
Warren,O. C17 ....5.40
Waukegan,Ill. A7 ....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40

RAIL STEEL BARS
ChicagoHts.(3,4)I-2, C2.4.75
Dallas,Tex.(4) S20 ....6.00
Franklin,Pa.(3,4) F5 ...4.75
FortWorth,Tex.(26) T4.4.63
Huntngtn,W.Va.(3) W7 .5.50
Marion,O.(3) P11 ....4.75
Moline,Ill.(3) R2 ....3.80
Tonawanda(3,4) B12 ...4.75
Williamsport(3) S19 ....5.00
Williamsport(4) S19 ....5.10

BARS, Wrought Iron
Dover,N.J.(Staybolt)U1 15.00
Dover(Eng.Bolt) U1 ..13.50
Dover(Wrgt.Iron) U1 .12.25
Economy,Pa.(S.R.) B14.9.60
Economy,Pa.(D.R.)B14 11.90
Economy(Staybolt)B14 12.20
McK.Rks.(Staybolt) L5.14.50
McK.Rks.(S.R.) L5 ....9.60
McK.Rks.(D.R.) L5 ..13.00

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ..3.70
Alton,Ill.(6) L1 ....3.45
Atlanta A11 ....4.25
Buffalo R2 ....3.70
Cleveland R2 ....3.70
Emeryville,Calif. J7 4.45
Fairfield,Ala. T2 ....3.70
Fontana,Calif. K1 ....4.40
Gary,Ind. C3 ....3.70
Houston,Tex. S5 ....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 ....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 ....4.40
Milton,Pa. B6 ....4.20
Minnequa,Colo. C10 ...4.50
Munhall,Pa. C3 ....4.50
Niles,Calif. P1 ....5.05
Pittsburg,Calif. C11 ...4.40
Pittsburgh J5 ....4.65
SandSprings,Okla. S5 ...4.60
Seattle B3, N14 ....4.45
So.Chicago,Ill. R2 ....3.70
So.Duquesne,Pa. C3 ...3.70
So.SanFrancisco B3 ...4.45
SparrowsPoint,Md. B2 ..3.70
Struthers,O. Y1 ....3.70
Torrance,Calif. C11 ...4.40
Youngstown C3, R2 ...3.70

BARS, Reinforcing
(Fabricated; to Consumers)
Huntington,W.Va. W7 ..5.50
Johnstown, ¼-1" B2 ...4.75
LosAngeles B3 ....5.45
Marion,O. P11 ....5.00
Seattle B3, N14 ....5.55
So.SanFrancisco B3 ...5.45
SparrowsPt., ¼-1" B2..4.75
Williamsport,Pa. S19 ...5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ..3.60
Ashland,Ky.(8) A10 ...3.60
Butler,Pa. A10 ....3.60
Cleveland J5, R2 ....3.60
Conshohocken,Pa. A3 ...4.00
Detroit M1 ....4.40
Dover,O. R1 ....5.65
Ecorse,Mich.(8) G5 ....3.80
Fairfield,Ala. T2 ....3.60
Fontana,Calif. 4.55
Gary,Ind. C3 ....3.60
GraniteCity,Ill. G4 ....4.30
Geneva,Utah G1 ....3.70
Ind.Harbor,Ind. I-2, Y1.3.60
Irvin,Pa. C3 ....3.60
Lackawanna,N.Y. B2 ..3.60
Munhall,Pa. C3 ....3.60
Niles,O. N12 ....5.25
Pittsburg,Calif. C11 ...4.30
Pittsburgh J5 ....3.60
Sharon,Pa. S3 ....4.00
So.Chicago,Ill. W14 ...3.60
SparrowsPoint,Md. B2 ..3.60
Steubenville,O. W10 ...3.60
Torrance,Calif. C11 ...4.30
Warren,O. R2 ....3.60
Weirton,W.Va. W6 ....3.60
WestLeechburg,Pa. A4..3.75
Youngstown C3, Y1 ...3.60

SHEETS, H-R (19 gage)
AlabamaCity,Ala. R2 ..4.75
Ind.Harbor,Ind. I-2 ...5.40
Mansfield,O. E6 ....5.65
Niles,O. N12 ....5.75
Torrance,Calif. C11 ...5.40

SHEETS, H-R (14-ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ....5.40
Conshohocken,Pa. A3 ..5.65
Ecorse,Mich. G5 ....5.50
Fairfield,Ala. T2 ....5.40
Fontana,Calif. K1 ....6.35
Gary,Ind. C3 ....5.40
Ind.Harbor,Ind. I-2 ...5.40
IndianaHarbor,Ind. Y1..5.90
Irvin,Pa. C3 ....5.40
Lackawanna(35) B2 ...5.40
Pittsburgh J5 ....5.40
Sharon,Pa. S3 ....5.40
So.Chicago,Ill. C3 ....5.40
SparrowsPoint(36) B2 ..5.40
Warren,O. R2 ....5.40
Weirton,W.Va. W6 ....5.75
Youngstown C3 ....5.40
Youngstown Y1 ....5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ....6.55
Ecorse,Mich. G5 ....6.65
Fontana,Calif. K1 ....7.50
Gary,Ind. C3 ....6.55
IndianaHarbor,Ind. Y1 .7.05
IndianaHarbor,Ind. I-2..6.55
Irvin,Pa. C3 ....6.55
Lackawanna(37) B2 ...6.55
Pittsburgh J5 ....6.55
SparrowsPoint(38) B2 ..6.55
Warren,O. R2 ....6.55
Weirton,W.Va. W6 ....6.90
Youngstown Y1 ....7.05

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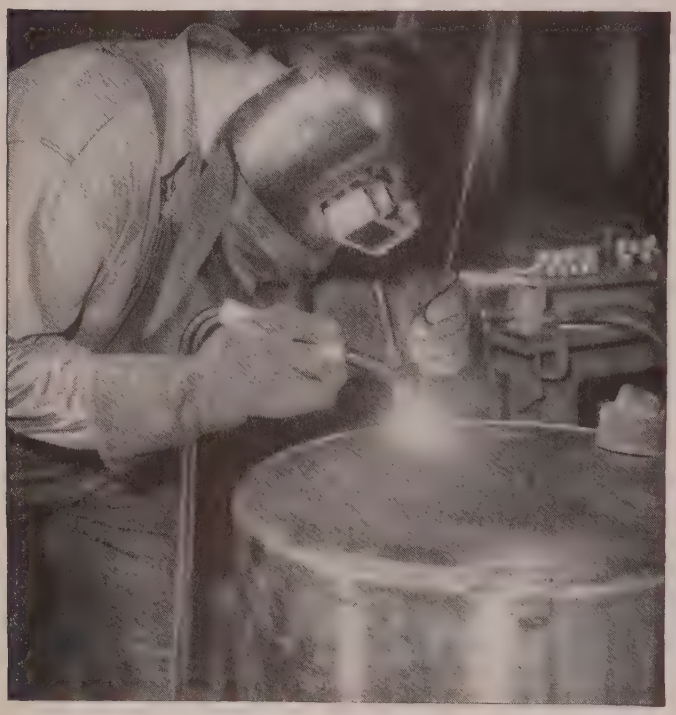

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(Product) (Metal) (Thickness)

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Name.....Position.....

Company.....

City.....State.....

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Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada:
DOMINION OXYGEN COMPANY, LIMITED, Toronto

i, Cold-Rolled Steel
ommercial Quality)

t ,Pa. A10 .....4.35
ev and J5, R2 .....4.35
so ,Mich. G5 .....4.55
ld,Ala. T2 .....4.35
sbee,W.Va. F4 ...5.35
a,Calif. K1 .....5.30
nd. C3 .....4.35
eCity,Ill. G4 .....5.05
arbor,Ind. I-2, Y1.4.35
Pa. C3 .....4.35
wanna,N.Y. B2 ..4.35
etown,O. A10 ....4.35
urg,Calif. C11 ...5.30
urgh J5 .....4.35
owsPoint,Md. B2 ..4.35
enville,O. W10 ....4.35
n,O. R2 .....4.35
on,W.Va. W6 ....4.35
stown Y1 .....4.35

i, Galv'd No. 10 Steel

maCity,Ala., R2 ..4.80
nd,Ky.(8) A10 ...4.80
n,O. R2 .....4.80
,O. R1 .....5.50
ld,Ala. T2 .....4.80
nd. C3 .....4.80
teCity,Ill. G4 ....5.50
arbor,Ind. I-2 ....4.80
Pa. C3 .....4.80
no,Ind.(13) C16 ..5.20
naFerry,O. W10 ...4.80
O. N12 .....6.00
urg,Calif. C11 ....5.55
owsPoint,Md. B2 ..4.80
enville,O. W10 ....4.40
nce,Calif. C11 ....5.55
on,W.Va. W6 ....4.80

S, Galvanized No. 10, h-Strength Low Alloy

Pa. C3 .....7.20
owsPoint(39) B2 ..6.75

S, Galvannealed Steel

n,O. R2 .....5.35
Pa. C3 .....5.35
mo,Ind.(13) C16...5.75
O. N12 .....6.55

S, ZINCGRIP Steel No. 10

r,Pa. A10 .....5.05
ietown,O. A10 ....5.05

S, Electro Galvanized

land R2 (28) 5.65
.O. R2 (28) 5.65
on,W.Va. W6 .....5.50

S, Zinc Alloy

Harbor,Ind. I-2 ....5.70

S, Long Terne Steel
ommercial Quality)

Bottom,W.Va.W10 5.20
,Ind. C3 .....5.20
nfield,O. E6 .....6.05
ietown,O. A10 .....5.20
,O. N12 .....6.00
ton,W.Va. W6 .....5.20

SHEETS, Long Terne, Ingot Iron
Middletown,O. A10 ....5.60

ROOFING SHORT TERNES
(Package; 8 lb coated)
Gary,Ind. C3 .....$17.50

MANUFACTURING TERNES
(Special Coated)
Fairfield,Ala. T2 .....$7.60
Gary,Ind. C3 .....7.50
Irwin,Pa. C3 .....7.50
SparrowsPoint,Md. B2 ..7.60
Yorkville,O. W10 .....7.50

SHEETS, Lt. Coated Ternes, 6 lb
Yorkville,O. W10 .....$8.40

SHEETS, Mfg. Ternes, 8 lb
(Commercial Quality)
Gary,Ind. C3 .....$9.50
Warren,O. R2 .....9.50
Yorkville,O. W10 .....9.50

BLUED Stock, 29 Ga.
Yorkville,O. W10 .....6.80
Follansbee,W.Va.(23)F4 6.85

SHEETS, Culvert No. 16

	Cu Alloy	Cu Fe
Ashland A10	5.60	...
Canton,O. R2 ...	5.65	6.10
Fairfield,Ala. T2.	5.60	5.85
Gary C3	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. C3	5.60	5.85
Kokomo C16	6.25	...
MartinsFy,O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt. B2..	5.60	...
Torrance,Cal. C11	6.35	...

SHEETS, Culvert, No. 16
Corrugated Ingot Iron
Ashland,Ky. A10 .....5.85
Fairfield,Ala. T2 .....5.60

SHEETS, Hot-Rolled Ingot Iron
18 Gage and Heavier
Ashland(8) A10 .....3.85
Cleveland R2 .....4.20
Ind.Harbor,Ind. I-2 ....3.85
Warren,O. R2 .....4.20

SHEETS, Cold-Rolled Ingot Iron
Cleveland R2 .....4.95
Middletown,O. A10 ....4.85
Warren,O. R2 .....4.95

SHEETS, Galvanized Ingot Iron
No. 10 flat
Ashland,Ky.(8) A10 ...5.05
Canton,O. R2 .....5.55

SHEETS, ZINCGRIP Ingot Iron
Butler,Pa. A10 .....5.30
Middletown,O. A10 ....5.30

SHEETS, Drum Body
Pittsburg,Calif. C11 ....4.30
Torrance,Calif. C11 ....4.30

SHEETS, ALUMINIZED
Butler,Pa. A10 .....8.15

SHEETS, Well Casing
Fontana,Calif. K1 .....5.10
TorranceCalif. C11 ....5.10

TIN PLATE, American 1.25 1.50

COKE (Base Box)	lb	lb
Aliquippa J5	*$8.45*	*$8.70*
Fairfield,Ala. T2..	*8.55*	*8.80*
Gary C3	*8.45*	*8.70*
Ind.Har. I-2, Y1.	*8.45*	*8.70*
Irvin,Pa. C3	*8.45*	*8.70*
Pitts.Cal. C11	*9.20*	*9.40*
Sp.Pt.,Md. B2 ...	*8.55*	*8.75*
Warren R2	*8.45*	*8.70*
Weirton W6	*8.45*	*8.70*
Yorkville,O. W10..	*8.45*	*8.70*

CANMAKING BLACK PLATE
(Base Box)
Aliquippa,Pa. J5 .....$6.25
Fairfield,Ala. T2 .....6.35
Gary,Ind. C3 .....6.25
GraniteCity,Ill. G4 .....6.45
Ind.Harbor,Ind. I-2, Y1..6.25
Irvin,Pa. C3 .....6.25
Niles,O. R2 .....6.25
Pittsburg,Calif. C11 ....7.00
SparrowsPoint,Md. B2 ..6.35
Warren,O. R2 .....6.25
Weirton,W.Va. W6 .....6.25
Yorkville,O. W10 .....6.25

HOLLOWARE ENAMELING
Black Plate (29 gage)
Follansbee,W.Va. F4 ...5.85
Gary,Ind. C3 .....5.85
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. Y1 ....5.30
Irvin,Pa. C3 .....5.85
Niles,O. R2 .....5.30
SparrowsPoint,Md. B2 ..5.40
Warren,O. R2 .....5.30
Yorkville,O. W10 .....6.15

SHEETS, Enameling Iron
Ashland,Ky.(8) A10 ....4.65
Cleveland R2 .....4.65
Ecorse,Mich. G5 .....4.70
Gary,Ind. C3 .....4.65
GraniteCity,Ill. G4 ....5.35
Ind.Harbor,Ind. I-2 ....4.65
Irvin,Pa. C3 .....4.65
Middletown,O. A10 ....4.65
Youngstown Y1 .....4.65

STRIP, Hot-Rolled,
High-Strength Low-Alloy
Atlanta(9) A11 .....5.10
Bessemer,Ala. T2 ....5.30
Conshohocken,Pa. A3 ..5.55
Ecorse,Mich. G5 .....5.40
Fairfield,Ala. T2 .....5.30
Fontana,Cal. K1 .....6.20
Gary,Ind. C3 .....5.30
Ind.Harb.,Ind. I-2 ....5.30
IndianaHarbor,Ind. Y1..5.80
Lackawanna,N.Y. B2 ..4.95
LosAngeles(25) B3 ....6.05
Seattle B3 .....6.30
Sharon,Pa. S3 .....5.40
So.SanFrancisco(25) B3.6.05
SparrowsPoint,Md. B2 ..4.95
Warren,O. R2 .....5.30
Weirton,W.Va. W6 .....5.75
Youngstown Y1 .....5.80
Youngstown C3 .....5.30

STRIP, Cold-Rolled Alloy Steel
Bridgeprt,Conn.(10)S15 10.10
Carnegie,Pa. S18 .....10.60
Cleveland A7.....10.00
Dover,O. G6 .....10.50
Fontana,Calif. K1 .....11.65
Harrison,N.J. C18 ....10.60
NewBritn.Conn.(10)S15 10.10
Pawtucket,R.I.(11) N8.10.75
Pawtucket,R.I.(12) N8.11.05
Sharon,Pa. S3 .....10.60
Worcester,Mass. A7 ...10.30
Youngstown C8 .....10.60

STRIP, Hot-Rolled Ingot Iron
Ashland,Ky.(8) A10 ....3.75
Warren,O. R2 .....4.10

STRIP, Hot-Rolled Carbon
Ala.City,Ala.(27) R2 ...3.50
Alton,Ill.(1) L1 .....3.25
Ashland,Ky.(8) A10 ....3.50
Atlanta A11 .....4.05
Bessemer, Ala. T2 ....3.50
Bridgeprt,Conn.(10) S15.4.00
Buffalo(27) R2 .....3.50
Butler,Pa. A10 .....3.50
Carnegie,Pa. S18 .....4.00
Conshohocken,Pa. A3 ..3.90
Detroit M1 .....4.40
Ecorse,Mich. G5 .....3.45
Fairfield,Ala. T2 .....3.50
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....3.50
Houston,Tex. S5 .....4.90
Ind.Harbor,Ind. I-2, Y1.3.50
Johnstown,Pa.(25) B2 ..3.50
KansasCity,Mo.(9) S5 ..4.10
Lackawanna,N.Y.(32)B2 3.50
LosAngeles B3 .....4.25
Milton,Pa. B6 .....4.00
Minnequa,Colo. C10 ....4.55
NewBritain(10) S15 ....4.00
N.Tonawanda,N.Y. B11.3.50
Pittsburg,Calif. C11 ....4.25
Riverdale,Ill. A1 .....3.50
SanFrancisco S7 .....4.85
Seattle B3. N14 .....4.50
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ....3.50
So.SanFrancisco B3 ....4.25
SparrowsPoint,Md. B2 ..3.50
Torrance,Calif. C11 ....4.25
Warren,O. R2 .....3.50
Weirton,W.Va. W6 .....3.60
WestLeechburg,Pa. A4..3.75
Youngstown C3, Y1 ....3.50

STRIP, Hot-Rolled Alloy
Bridgeprt,Conn.(10) S15 5.45
Carnegie,Pa. S18 .....5.85
Fontana,Calif. K1 .....6.70
Gary,Ind. C3 .....5.50
Houston,Tex. S5 .....5.90
KansasCity,Mo. S5 ....6.10
NewBritn,Conn.(10) S15 5.45
Sharon,Pa. S3 .....5.85
Youngstown C3 .....5.50

STRIP, Electro Galvanized
Cleveland A7 .....4.65
Dover,O. G6 .....5.00
Warren,O. T5 .....5.25

STRIP, Cold-Finished,

Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	....
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Detroit D2	5.60	6.65	7.25	...	....
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
Franklin,Park,Ill. T6 ..	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	....
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2 ..	5.85	6.75	7.35	....	....
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. N8:					
Cleve-or-Pitts.Base ..	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2 .	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6 ...	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7 ..	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6 ...	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork W3	...	...	10.30	12.50	15.35

Weirton,W.Va. W6 ....4.65
Youngstown C8 .....5.25

STRIP, Cold-Rolled Carbon
Anderson,Ind.(40) G6 ..5.50
Berea,O. C7 .....6.60
Bridgeprt,Conn.(10) S15.5.35
Butler,Pa. A10 .....4.65
Cleveland A7, J5 .....4.65
Dearborn,Mich. D3 ....5.10
Detroit D2 .....5.60
Detroit M1 .....5.45
Dover,O.(40) G6 .....5.50
Ecorse,Mich. G5 .....4.35
Follansbee,W.Va. F4 ...5.35
Fontana,Calif. K1 .....6.30
FranklinPark,Ill.(40)T6 4.90
Ind.Harbor,Ind. I-2 ....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles C1 .....6.40
Mattapan,Mass. T6 ....5.50
Middletown,O. A10 ....4.65
NewBritain(10) S15 ....5.35
NewCastle,Pa. B4 .....5.35
NewHaven,Conn. D2 ...5.85
NewHaven,Conn. A7 ...5.15
Pawtucket,R.I. R3 .....6.00
Pawtucket,R.I.(21) N8..5.85
Riverdale,Ill.(40) A1 ...4.90
Rome,N.Y. R6 .....5.10
Sharon,Pa. S3 .....5.35
SparrowsPoint,Md. B2 ..4.65
Trenton,N.J. R5 .....6.00
Wallingford,Conn. W2 ..5.85
Warren,O.(40) T5 .....5.25
Warren,O. R2 .....4.65
Weirton,W.Va. W6 ....4.65
WestLeechburg,Pa. A4..4.65
Youngstown C8, (40) ...5.25
Youngstown Y1 .....4.65

STRIP, Cold-Rolled,
High-Strength Low-Alloy
Cleveland A7, J5 .....6.70
Dover,O. G6 .....7.30
Ecorse,Mich. G5 .....6.65
Fontana,Calif. K1 .....6.95
Lackawanna,N.Y. B2 ..6.40
Sharon,Pa. S3 .....6.55
SparrowsPoint,Md. B2 ..6.40
Warren,O. R2 .....6.55
Weirton,W.Va. W6 ....7.20
Youngstown Y1 .....7.05

STRIP, Cold-Rolled Ingot Iron
Warren,O. R2 .....5.25

PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
hippa,Pa. J5	*$7.15*	*$7.40*	*$7.80*
ield,Ala. T2	*7.25*	*7.50*	*7.90*
a,Ind. C3	*7.15*	*7.40*	*7.80*
iteCity,Ill. G4	*7.35*	*7.60*	*8.00*
Harbor,Ind. I-2, Y1	*7.15*	*7.40*	*7.80*
,Pa. C3	*7.15*	*7.40*	*7.80*
,O. R2	*7.15*	*7.40*	*7.80*
burg,Calif. C11	*7.90*	*8.15*	*8.40*
rowsPoint,Md. B2	*7.25*	*7.50*	*7.75*
ton,W.Va. W6	*7.15*	*7.40*	*7.80*
ville,O. W10	*7.15*	*7.40*	*7.80*

TS, SILICON, H.R. or C.R.(22 Ga.)

S (Cut Lengths ½c lower)	Field	Arma-ture	Electric	Motor	Dyna-mo
hBottom W10 (cut lengths)	...	...	7.25	8.50	9.30
kenridge,Pa. A4	...	...	7.75	9.00	9.80
iteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Harbor,Ind. I-2	6.95	7.25	(34)	...	...
sfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
a,O. N12 (cut lengths)...	...	6.75	7.25	...	...
dergrift,Pa. C3	...	7.25	7.75	9.00	9.80
ren,O. R2	6.95	7.25	7.75	9.00	9.80
esville,O. A10	...	7.25	7.75	9.00	9.80

TS, SILICON (22 Ga. Base)
(Cut Lengths ½c lower)

sformer Grade	72	65	58	52
hBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
kenridge,Pa. A4	10.35	....	....	....
dergrift,Pa. C3	10.35	10.90	11.60	12.40
ren,O. R2	10.35	....	....	....
esville,O. A10	10.35	10.90	11.60	12.40

or C.R. COILS AND

LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
ler,Pa. A10 (C.R.)	....	....	14.75	15.25
dergrift,Pa. C3	12.90	13.75	14.75	15.25

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.
B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.
C1 Calif. Cold Rolled Steel
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve.Cold.Roll.Mills Co.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.
F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
H1 Hanna Furnace Corp.
H4 Heppenstall Co.
I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
C11 Columbia Steel Co.

A Thrriffty Thought

Have you considered using Boron as an alloying agent to help conserve the critical materials . . . Chrome, Manganese, Nickel and Molybdenum?

Borosil is a proven and economical alloy for making Boron additions. Borosil consists of 3 to 4% Boron, 40 to 45% Silicon and the remainder Iron. This diluted Boron alloy is ideally suited for ladle additions.

Borosil is immediately available in following sizes to meet your requirements . . . Standard lump, 2" x Down, ½" x Down, and 8 Mesh x Down.

FERRO-SILICON 25 - 50 - 65 - 75 - 85 - 90%
SPECIAL BLOCKING 50% FERRO-SILICON
LOW CARBON FERRO-CHROME SILICON
HIGH CARBON FERRO-CHROME
FERRO-MANGANESE • BOROSIL • SIMANAL

BRIQUETS

SILICON • MANGANESE • CHROME
SILICO - MANGANESE

PHILO RAINIER

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Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh Tacoma Seattle
Minneapolis Birmingham San Francisco Los Angeles

SALES AGENTS AND WAREHOUSES:

SAN FRANCISCO AREA—Pacific Graphite Company, Inc., Oakland 8, California.

LOS ANGELES AREA—Snyder Foundry Supply Company, Los Angeles 11, California.

MINNEAPOLIS AREA—Foundry Supply Company, Minneapolis, Minnesota.

MEXICO—Casco S. de R. L., Apartado Postal 1030, Calle Atenas 32-13, Mexico, D. F., Mexico.

SALES AGENTS, NO WAREHOUSES:

NORTHWEST AREA—E. A. Wilcox Company, Arctic Building, Seattle 4, Washington; Phone Mutual 1468.

BIRMINGHAM DISTRICT—Schuler Equipment Company, First National Building, Birmingham, Alabama.

COOPERAGE HOOP

A11	4.05
ale,Ill. A1	3.90
,Pa. B3	4.15
town C3	3.75

Spring, High Carbon

pa.,Pa. J5	6.25
ll.(1) L1	5.90
rville,Ill.(1) K4	6.25
W12	*6.35*
nd A7	6.25
t,Pa. A7	6.25
A7	6.25
ia,O. S1	6.20
own,Pa. B2	6.25
geles B3	7.20
ry,Mass.(12) N6	6.20
sen,Pa. P7, P16	6.25
Mass. W12	*6.55*
rg,Calif. C11	7.20
ing,N.J. R5	6.55
louth,O. P12	6.25
cago,Ill. R2	6.25
Francisco C10	6.85
owsPoint,Md. B2	6.35
ers,O. Y1	6.25
n,N.J. A7	6.55
gan,Ill. A7	6.25
ster A7, J4, W12	6.55
ster,Mass. N6, T6	6.20

Cold-Rolled Flat

son,Ind. G6	6.20
W12	*6.35*
nd A7	5.85
ordsville,Ind. M8	6.20
D2	6.20
O. G6	6.20
a,O. S1	6.00
o,Ind. C16	5.70
inPark,Ill. T6	6.20
lon, O. R8	5.85
sen,Pa. P16	5.85
sen,Pa. P7	6.10
ven,Conn. D2	6.50
cket,R.I.(12) N8	6.85
on,N.J. R5	6.15
ster T6	6.50
ster W12	*6.65*
ster A7	6.00

Fine and Weaving
(n. Coils)

nville,Ill.(1) K4	8.90
o W12	*8.90*
go W13	8.90
nd A7	8.90
ordsville,Ind. M8	8.95
ria,O. S1	8.90
town,Pa. B2	8.45
no,Ind. C16	8.90
sen,Pa. P16	8.90
Mass. W12	*9.20*
mouth,O. P12	8.90
ing,N.J. R5	9.20
egan,Ill. A7	8.90
ster,Mass. A7, T6	9.20

WIRE

	Mild Plow	Plow	Imp. Plow
nville Ill. K4	8.55	8.55	8.80
o W12	*8.55*	*8.55*	*8.80*
land A7	8.55	8.55	8.80
ra,Pa. A7	8.55	8.55	8.80
ria,O. S1	8.35	8.35	8.60
town,Pa. B2	8.05	8.05	8.30
ssen,Pa. P16	8.55	8.55	8.80
ssen,Pa. P7	8.80	8.80	9.05
aven,Conn A7	8.85	8.85	9.10
r,Mass. W12	*8.85*	*8.85*	*9.10*
mouth,O. P12	8.55	8.55	8.80
ing,N.J. R5	8.85	8.85	9.10
owsPoint,Md. B2	8.15	8.15	8.40
hers O. Y1	8.55	8.55	8.80
on,N.J. A7	8.85	8.85	9.10
egan,Ill. A7	8.55	8.55	8.80
msport,Pa. B2	8.15	8.15	8.40
ester,Mass. J4	8.35	8.35	8.60
ester,Mass. T6	8.85	8.85	9.10

WIRE, Tire Bead

Bartonville,Ill.(1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	4.85
Aliquippa,Pa. J5	4.85
Atlanta A11	5.10
Alton,Ill.(1) L1	4.50
Bartonville,Ill.(1) K4	4.85
Buffalo W12	*4.85*
Chicago W13	4.85
Cleveland A7	4.85
Cleveland C20	4.55
Crawfordsville,Ind. M8	5.10
Donora,Pa. A7	4.85
Duluth A7	4.85
Fairfield,Ala. T2	4.85
Fostoria,O.(24) S1	5.00
Houston S5	5.25
Johnstown,Pa. B2	4.85
Joliet,Ill. A7	4.85
KansasCity,Mo. S5	5.45
Kokomo,Ind. C16	4.95
LosAngeles B3	5.80
Minnequa,Colo. C10	5.10
Monessen,Pa. P7	5.10
Newark, 6-8ga, I-1	5.50
No. Tonawanda B11	4.85
Palmer,Mass. W12	*5.15*
Pittsburg,Calif. C11	5.80
Portsmouth,O. P12	5.25
Rankin,Pa. A7	4.85
So.Chicago,Ill. R2	4.85
So.SanFrancisco C10	5.80
SparrowsPoint,Md. B2	4.95
Sterling,Ill.(1) N15	4.85
Struthers,O. Y1	4.85
Torrance,Calif. C11	5.80
Waukegan,Ill. A7	4.85
Worcester,Mass. A7, T6	5.15

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.55
Buffalo W12	*5.90*
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	*6.20*
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	6.85
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester,Mass. A7	6.20

WIRE, Merchant Quality (6 to 8 gage)

	An'ld.	Galv.
AlabamaCity R2	5.10	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19)K4	5.95	6.15
Buffalo W12	*4.85*	...
Cleveland A7	5.70	6.15
Crawfordsville M8	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	*5.15*	...
Pitts.Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
SparrowsPt, B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	11.85
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle M.8	10.30	12.00
Fostoria,O. S1	10.40	12.40
Johnstown B2	10.15	12.05
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass. W12	*10.25*	*12.15*
Pitts.,Cal. C11	10.25	12.15
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.25	12.15
Waukegan A7	10.25	12.15

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	136
Aliquippa,Pa. J5	140
Atlanta A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville M8	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala. T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	136
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2	140
Duluth A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	130
Johnstown,Pa. B2	125
Joliet,Ill. A7	125
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. R2	136
So.Chicago R2	140
Tonawanda B12	140
Williamsport,Pa. S19	150

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2	126
Ala.City,Ala.,17-18ga.R2	213
Aliquippa,Pa.9-14½ga. J5	130
Atlanta A11	133
Bartonville,Ill.(19) K4	130
Crawfordsville,Ind. M8	132
Donora,Pa. A7	130
Duluth A7	130
Houston,Tex. S5	138
Fairfield,Ala. T2	130
Johnstown,Pa. B2	130
Johnstown,17ga.,6" B2	204
Johnstown,17ga.,4" B2	207
Joliet,Ill. A7	130
KansasCity,Mo. S5	142
Kokomo,Ind. C16	132
Minnequa,Colo. C10	138
Monessen,Pa. P7	135
Pittsburg,Calif. C11	153
Portsmouth,O.(18) P12	137
Rankin,Pa. A7	130
So.Chicago,Ill. R2	126
Sterling,Ill.(1) N15	130

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Chicago W13	123
Crawfordsville M8	132
Donora,Pa. A7	123
Duluth A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

AXLES

Ind Harbor,Ind. S13	5.60
Johnstown,Pa. B2	5.60

JOINT BARS

Bessemer,Pa. C3	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. C3	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

RAILS

	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. C3	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...(16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

NAILS & STAPLES, Stock to dealers & mfrs. (7)

	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	130
Cleveland A9	111
Crawfordsville,Ind. M8	122
Donora,Pa. A7	118
Duluth A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	6.10
Bartonville,Ill.(19) K4	5.95
Crawfordsville,Ind. M8	6.30
Donora,Pa. A7	5.95
Duluth A7	5.95
Johnstown,Pa. B2	5.95
Joliet,Ill. A7	5.95
Kokomo,Ind. C16	6.05
Minnequa,Colo. C10	6.20
Pittsburg,Calif. C11	6.90
Portsmouth,O. P12	6.25
Rankin,Pa. A7	5.95
So.Chicago,Ill. R2	6.10
SparrowsPoint,Md. B2	6.05
Sterling,Ill.(1) N15	5.65
Worcester,Mass. A7	6.25

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3	$7.35
Wheeling,W.Va. W10	7.15

TIE PLATES

Fairfield,Ala. T2	4.50
Gary,Ind. C3	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Pittsburg,Calif. C11	4.65
Seattle B3	4.65
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

TRACK BOLTS (20) Treated

KansasCity,Mo. S5	9.85
Lebanon,Pa.(32) B2	9.85
Minnequa,Colo. C10	9.85
Pittsburgh O3, P14	9.85
Seattle B3	10.10

TOOL STEELS

Grade	Cents per lb
Reg. Carbon	23.00
Extra Carbon	27.00
Spec. Carbon	32.50
Oil Hardening	35.00
Cr Hot Wrk	35.00
Hi-Carbon-Cr	63.50
18W,4Cr,1V	110.00
18W,4Cr,2V	124.50

Grade	Cents per lb
18W,4Cr,3V	140.00
18W,4Cr,2V,9Co	204.00
19W,4Cr,2V,7Co	204.00
18.25W,4.25Cr,1V,4.75Co	172.00
20.25W,4.25Cr,1.6V,12.25Co	323.00
1.5W,4Cr,1V,8.5Mo	78.50
6.4W,4.5Cr,1.9V,5Mo	84.00
6W,4Cr,3V,6Mo	106.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M14, S8, T7, U4, V2, V3.

Key to Producing Companies

McLouth Steel Corp.
Mahoning Valley Steel
Medart Co.
Mercer Tube & Mfg. Co.
Mid-States Steel & Wire
Midvale Co.
Missouri-Illinois Furnace
Moltrup Steel Products
Monarch Steel Co.
McInnes Steel Co.

National Supply Co.
National Tube Co.
Nelsen Steel & Wire Co.
NewEng.HighCarb.Wire
Newman-Crosby Steel
Niles Rolling Mill Co.
Nrthwst. Steel Roll. Mills
Northwestern S.&W. Co.
New Delphos Mfg. Co.

Oliver Iron & Steel Corp.
Oregon Steel Mills

Pacific States Steel Corp.
Pacific Tube Co.
Phoenix Iron & Steel Co.
Pilgrim Drawn Steel
Pittsburgh Coke&Chem.
Pittsburgh Steel Co.
Pittsburgh Tube Co.
Pollak Steel Co.

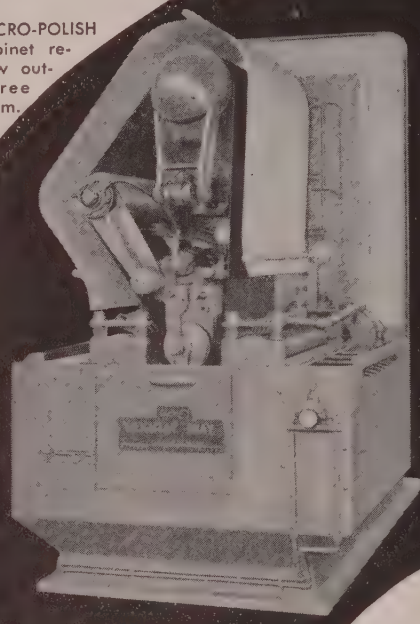
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts.Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RellianceDiv.,EatonMfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield,S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel

T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U1 Ulster Iron Works
U4 Universal Cyclops Steel
V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Corp.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet&Tube

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga & heavier.
(14) Also wide flange beams.
(15) ¼" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga, 36" wide.
(24) Deduct 0.20c for finer than 15 gage.
(25) Bar mill bands.
(26) Reinforcing, to fabricators (⅝" bar elec. furn. billet, 5.03c); to consumers, 5.28c.
(27) Bar mill sizes.
(28) Rondorized.
(29) Subject to 10% increase, f.o.b. mill.
(31) Not annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter; 60" & narrower.
(38) 14 gage & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.

At right, MICRO-POLISH unit showing easily accessible controls and neat, compact design.

At left, MICRO-POLISH unit with cabinet removed to show outstanding M-W, three roll belt control system.



MURRAY-WAY MICRO-POLISH

A typical multiple unit installation using twelve standard units in line.

THE BETTER WAY OF SHEET-GRINDING AND POLISHING — PROVED RIGHT IN ACTUAL OPERATION

MICRO-POLISH gives you —

- Higher quality surface for any given grain size.
- A much faster grinding rate without burning.
- Substantial operating economies.
- Unbelievable versatility. MICRO-POLISH handles strip, sheet or blanked parts, any width or length.
- A wet or dry process to meet your needs.
- Dependable, convenient controls, fully shielded from abrasives and foreign matter.

We also manufacture a complete line of automatic buffing and polishing equipment, to handle any contoured or formed parts. Your inquiries are invited.

MURRAY WAY

THE MURRAY-WAY CORPORATION

3925 WEST FORT STREET • DETROIT 16, MICHIGAN

AUTOMATIC POLISHING, BUFFING, GRINDING EQUIPMENT

STANDARD PIPE, T. & C.

'ELD List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Black— A	B	C	—Galvanized— D	E	F
5.5c	0.24	34.0	32.0	29.0	1.5	+0.5	0.5
6.0	0.42	28.5	26.5	26.0	+1.0	+3.0	0.5
6.0	0.57	23.5	21.5	21.5	+7.0	+9.0	4.0
8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
11.5	1.13	39.0	37.0	38.0	18.0	16.0	17.0
17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
76.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

nn A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Ben- W. Va., 3½ points lower on ⅛", 1½ points lower on and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 higher on ⅛", 2 points lower on ¼" and ⅜"; fol- g make ½" and larger: Lorain, O., N3; Youngstown nd 36½% on 3½" and 4"; Youngstown Y1; Aliquippa, J5. Fontana, Calif. K1 quotes 11½ points lower on and larger continuous weld and 24% on 3½" and 4".

nns B & E: Sparrows Point, Md. B2.

nns C & F: Indiana Harbor, Ind., ½" through 3", Y1; , Ill. (Lorain base) L1.

nn D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, t plus 3½% on ⅛", plus 2½% on ¼", plus 9% on Sharon, Pa. M6, plus 0.5 on ⅜", 1 point lower on ⅝", 1½ points lower on 1" and 1¼", 2 points lower on ½", 2", 2½" and 3". Following quote only on ½" and r: Lorain, O. N3; Youngstown R2, and 16½% on 3½" ⅝"; Youngstown Y1; Aliquippa, Pa. J5 quotes 1 point on ⅝", 2 points lower on 1", 1½ points lower on 2 points lower on 1½" and 2", 1½ points lower on and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

LESS AND RIC WELD List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Galv. B	Elec. Weld Black C	Galv. D
37.0c	3.68	29.5	9.5	29.5	9.5
58.5	5.82	32.5	12.5	32.5	12.5
76.5	7.62	32.5	12.5	32.5	12.5
92.0	9.20	34.5	14.5	34.5	14.5
$1.09	10.89	34.5	14.5	34.5	14.5
1.48	14.81	37.0	17.0	37.0	17.0
1.92	19.18	37.0	17.0	37.0	17.0

lumn A: Aliquippa J5; Ambridge N2; Lorain N3; gstown Y1.

lumn B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt r on 2½-6 in.; Lorain, N3; Youngstown Y1.

lumns C & D: Youngstown R2.

BOILER TUBES

t base c.l. prices, dollars per 100 ft. mill; minimum thickness, cut lengths 10 to 24 ft. inclusive.

B.W. Ga.	—Seamless— H.R.	C.D.	Elec. Weld H.R.	C.D.
13	12.36	14.39	18.96	13.96
13	14.63	17.05	14.19	16.54
13	16.17	19.02	15.68	18.45
13	18.39	21.64	17.84	20.99
13	20.61	24.24	19.99	23.51
13	22.96	27.08	22.27	26.22
12	25.29	29.76	24.53	28.87
12	27.71	32.58	26.88	31.60
12	29.36	34.53	28.48	33.49
12	30.82	36.27	29.90	35.18

CLAD STEELS

(Cents per pound)

ding less	—Plates— Carbon Base 10%	20%	—Strip— Cold-Rolled Carbon Base Both Sides 10%	Sides	—Sheets— Carbon Base 10%	20%	Cu Base Both Sides
...	....	....	....	....	19.75	27.50	77.00
...	25.00	28.00– 29.50	....	....	20.75– 23.50	29.00	77.00
...	30.50	35.00	....	....	....	....	....
...	36.50	41.00	....	....	....	....	144.00
...	29.50	31.50– 34.00	....	....	26.00	36.50	....
...	34.50	39.00	....	....	....	....	....
...	33.50	38.00	....	....	....	....	....
...	26.50	31.00	....	....	23.00	....	111.00
...	27.50	30.50– 32.00	....	....	24.00	35.00	130.00
...	21.25	27.75	....	....	....	....	....
...	20.75	27.25	....	....	....	....	....
cel .	31.00	41.00	41.00	54.00	....	....	....
onel.	39.00	51.00	....	....	....	....	165.00
el .	32.00	42.00	....	....	....	....	....
per*	....	....	23.70†	29.65‡	....	....	....

Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot- ed. Production points for carbon base products: Stain- plates, sheet, Conshohocken, Pa. A3 and New Castle, . I-4; stainless-clad plates, Claymont, Del. W16, Coates- , Pa. L7 and Washington, Pa. J3; nickel, inconel, el-clad plates, Coatesville L7; nickel, monel, copper-clad p, Carnegie, Pa., S18. Production point for copper-base ets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ⅝-in. 18.5
- ¾-in. and larger..... 17.5

Longer than 6 in.:
- All diams. 14

Lag bolts, all diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 26
Blank 34
Plow 34
Step, Elevator, Tap, and Sleigh Shoe 21
Tire bolts 12
Boiler & Fitting-Up bolts 31

NUTS

	Reg.	Heavy
H.P. & C.P. Square:		
½-in. & smaller	15	15
⅝-in. & ⅝-in. .	12	6.5
¾-in.-1½-in. ..	9	1
1⅝ in. & larger	7.5	1
H.R. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅝-in.	16.5	6.5
¾-in.-1½-in. ..	12	2
1⅝ in. & larger	8.5	2
C.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅝-in..	23	17.5
¾-in. & 1½-in.	19.5	12
1⅝-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Hvy.	Reg.
½-in. & smaller....	35	28.5
⅝-in. & ⅝-in. ...	29.5	22
¾-in.-1½-in.	24	15
1⅝-in. & larger....	13	8.5

Light
- ⅝-in. & smaller 35
- ½-in. to ⅝-in. 28.5
- ¾-in. to 1½-in. 26

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish .....56 & 10
Plated finishes.....41 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 47
- ¾-in. through 1 in. ... 40

Longer than 6 in.:
- ⅝-in. & smaller 33
- ¾-in. through 1 in. ... 18

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 44
1 in. and smaller diam. x over 6 in. 33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 41
¼-in. diam. & larger .. 24
N.F. thread, all diams... 18

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.85c
⅞-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ....List to 50c off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Diam.—Inches—	Length	Cents per lb
17,18,20	60,72	17.00
8 to 16	48,60,72	17.00
7	48,60	18.64
6	48,60	19.95
4,5⅛	40	20.48
3	40	21.53
2½	24,30	22.05
2	24,30	24.15

CARBON

40	100,110	7.65
35	100,110	7.65
30	84,110	7.65
24	72 to 104	7.65
17 to 20	34,90	7.65
14	60,72	8.16
10,12	60	8.42

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	41.00	34.00	31.25
302...	41.00	36.50	31.25
303...	43.00	40.00	33.75
304...	43.00	38.50	32.75
309...	55.50	54.50	44.25
316...	56.50	58.50	48.75
321...	49.00	48.00	36.75
347...	53.50	52.00	41.25
410...	36.50	30.50	25.75
416...	37.00	37.00	26.25
420...	44.00	47.00	31.25
430...	39.00	31.00	26.25
501...	27.50	26.00	14.25
502...	28.50	27.00	15.25

Brackenridge, Pa., sheets A4.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.

Cleveland, strip A7.

Dunkirk, N.Y., bars, wire A4.

Duquesne, Pa., bars C3.

Gary, Ind., sheets except Type 416 C3.

Harrison, N. J., strip C18.

McKeesport, Pa., bars, sheets except Type 416 C3.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars C3.

Pittsburgh, sheets C18.

Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.

So. Chicago, Ill., bars & structurals C3.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.

Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 30.00-35.00
Toluol, one deg...26.00-33.00
Industrial xylol ..25.00-33.50
Per ton bulk, ovens
Sulphate of ammonia..$32.-45
Cents per pound, ovens
Phenol, 40 (carlots, non-returnable drums) ..17.25
Do., less than carlots..18.00
Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $41; less than 60%, $38.

Imported, net ton, duty paid, metallurgical grade, $28-$29.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

Sponge Iron Cents
98+% Fe, carlots.. 16.00
Swedish, c.i.f. New York, in bags....7.40-8.50
Electrolytic Iron:
Annealed, 99.5% Fe. 42.50
Unannealed, 99+% Fe 36.50
Unannealed, 99+% Fe(minus 325 mesh) 58.50
Powder Flakes 48.50
Carbonyl Iron:
97.9-99.8%, size 5 to 10 microns...83.00-148.00
Aluminum:
Carlots, freight allowed 29.50
Atomized, 500 lb drums, freight allowed 33.50
Brass, 10-ton lots 30.00-33.25
Copper:
Electrolytic 37.50
Reduced 33.75-37.00
Lead 25.50
Manganese:
Minus 100-mesh 57.00
Minus 35 mesh 52.00
Minus 200 mesh 62.00
Nickel unannealed 83.00
Nickel-Silver, 10-ton lots 44.00
Silicon 38.50
Solder (plus cost of metal) 8.50
Stainless Steel, 302.... $1.25
Tin $1.69
Zinc, 10-ton lots.23.00-30.50
Tungsten: Dollars
99%, minus 80 to 200 mesh, freight allowed: over 1000 lb 2.90
1000 lb 2.95
Less than 1000 lb ... 3.00
98.8% minus 65 mesh, freight allowed:
1000 lb and over... 4.15
less than 1000 lb... 4.25
Molybdenum:
99%, minus 80 to 200 mesh,
over 500 lb 2.85
200 to 500 lb 3.10
less than 200 lb ... 3.25
Chromium, electrolytic 99% Cr min. 3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll,fur. .$14.50-15.00
Connellsvll,fdry. .17.00-18.00
New River, foundry ...19.50
Wise county, foundry..15.95
Wise county, furnace..15.20

OVEN FOUNDRY COKE

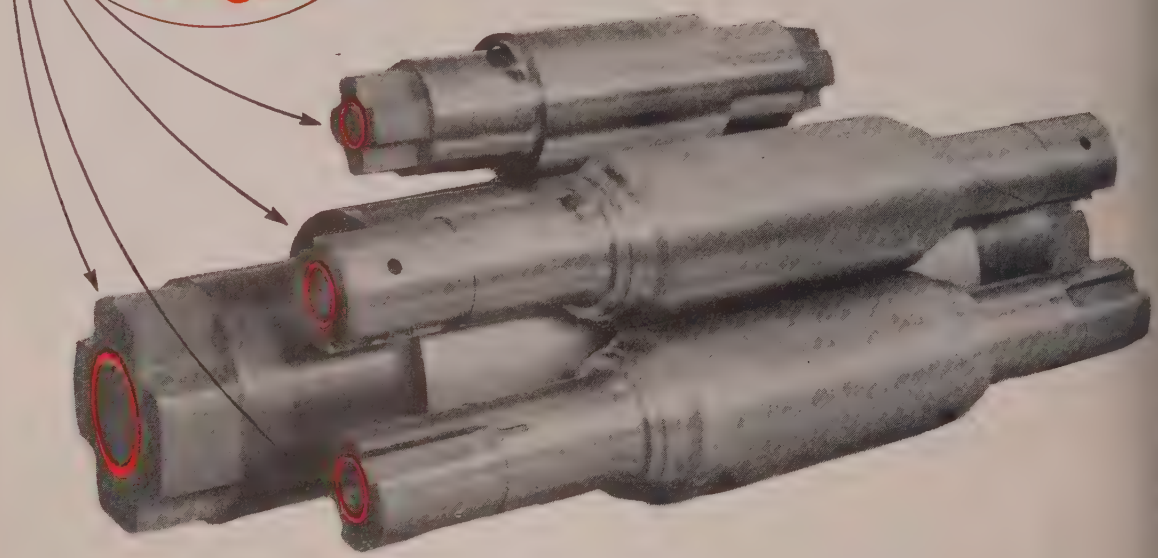
Kearney, N. J., ovens.$22.75
Everett, Mass., ovens New England, del...‡24.80
Chicago, ovens 21.00
Chicago, del. .....‡22.45
Detroit, del. 24.91
Terre Haute, ovens....22.50
Milwaukee, ovens 23.75
Indianapolis, ovens 22.75
Chicago, del. 26.62
Cincinnati, del. 25.67
Detroit, del. 26.65
Ironton, O., ovens 21.50
Cincinnati, del. 24.06
Painesville, O., ovens..24.00
Buffalo, del. 26.12
Cleveland, del. 25.72
Erie, Pa., ovens 23.50
Birmingham, ovens 20.30
Birmingham, del. ...21.35
Philadelphia, ovens ...22.70
Nevillelsland,Pa.,ovens 23.00
Swedeland, Pa., ovens.22.00
St. Louis, ovens 24.25
St. Louis, del. 25.38
Portsmouth, O., ovens.21.50
Cincinnati, del. 24.06
Detroit, ovens 24.00
Detroit, del. *25.00
Buffalo, del. 27.04
Flint, del. 26.44
Pontiac, del. 25.39
Saginaw, del. 26.75

Includes representative switching charge of: *, $1.00; †, $1.45, one-track charge being $1.20, two tracks $1.40; and three or more tracks $1.50. ‡ Or within $4.15 freight zone from works.

Hyde Park

ALLOY IRON And CHILLED ROLLS

RED CIRCLE Rolls ALLOY–CHILLED



Outstanding in quality and performance, Hyde Park Rolls have enjoyed the respect and confidence of the industry for more than fifty years.

Hyde Park Rolls for every purpose may be quickly identified by the Red Circle.

Chilled and Alloy Iron, Moly, Nickel Chilled, Grain, Cold and Sand Rolls.

GRAY IRON CASTINGS

Castings up to 80,000 pounds. Furnace Castings, Machinery Castings, Slag Pots, Bases, Lathes, Heavy Tools, Housings, etc.

ROLLING MILL MACHINERY

Rolling Mill Equipment including Mill Shears, Stretcher Levellers, Mill Reduction Drives, Sheet Pack Carriers, Roll Lathes, Gears, Pinions, Layout Tables, Surface Plates, Floor Plates, etc.

Consult us on your next requirements

Hyde Park Foundry and Machine Co.

Hyde Park WESTMORELAND COUNTY PITTSBURGH DISTRICT **Penna.**

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
York (city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
York (c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
on (city) ..	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
on (c'try) .	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
. (city) ..	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
.. (c'try) ..	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
(city) ...	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
(c'try) ..	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
olk, Va. ..	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
mond, Va..	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
n. (w'hse) .	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
alo (del.)..	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
alo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.05	7.35
. (w'hse) .	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
oit (w'hse).	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
eland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
e. (w'hse) .	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
in. (city) ..	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
ago (city) .	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
ago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
aukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
au. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
Louis (del.)	5.68	6.48	7.28	5.63	...	5.63	6.28	10.08††§	5.78	5.93	7.13
L. (w'hse).	5.48	6.28	7.08	5.43	...	5.43	6.08	9.88††§	5.58	5.73	6.93
s. City (city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
sCity (w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
ha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
'hm (city) .	5.75	6.55	6.90§	5.70	...	5.70	7.53	...	5.85	6.10	8.25
'hm (w'hse)	5.60	6.40	6.75§	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Ang. (city)	6.55	8.10	9.05§	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
. (w'hse)..	6.35	7.90	8.85§	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
Francisco..	6.65	7.80*	8.65*	6.60	...	6.45	8.20	...	6.45	6.50	8.60
tle-Tacoma.	7.05	8.60§	9.20	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage a excluded); ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [5]—1000 to 1999 lb; [7]—300 to 999 lb; [9]—400 to 9999 lb.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

er Duty: St. Louis, Vandalia, Farber, ico. Mo., Olive Hill, Hayward, Ashland, Clearfield, Curwensville, Pa., Ottawa, Ill., 60. Hard-fired, St. Louis, Vandalia, Mo., e Hill, Ky., $156.20.

-Heat Duty: Salina, Pa. $99.60; Wood- ge, N. J., St. Louis, Farber, Vandalia, ico, Mo., West Decatur, Orviston, Clear- d, Beach Creek, Curwensville, Lumber, khaven, Pa., Olive Hill, Hitchins, Halde- n, Ashland, Ky., Troup, Athens, Tex., ens Pottery, Ga., Bessemer, Ala., Ports- ith, Oak Hill, O., Ottawa, Ill.,$94.60.

rmediate-Heat Duty: St. Louis, Farber, dalia, Mo., West Decatur, Orviston, Beach k, Curwensville, Lumber, Lockhaven, St. ys, Clearfield, Pa., Olive Hill, Hitchins, deman, Ashland, Hayward, Ky., Athens, up, Tex., Stevens Pottery, Ga., Ports- ith, O., Ottawa, Ill., $88; Bessemer, Ala., 20.

-Heat Duty: Oak Hill, or Portsmouth, O., rfield, Orviston, Pa., $79.20; Parral, O., 50; St. Marys, Pa., $76; Ottawa, Ill., $70.

LADLE BRICK

Press: Chester, New Cumberland, W. Va., eport, Merill Station, Clearfield, Pa., Iron- , Wellsville, O., $66.

e Cut: Chester, Wellsville, O., $64.

MALLEABLE BUNG BRICK

Louis, Vandalia, Farber, Mo., Olive Hill, , $105.60; Beach Creek, Pa., $94.60; Otta- Ill., $90.

SILICA BRICK

Union, Claysburg, or Sproul, Pa., Ports- ith, O., Ensley, Ala., $94.60; Hays, Pa., 0.10; Joliet, Rockdale, Ill., E. Chicago, ., $104.50; Lehi, Utah, Los Angeles, 1.10.

tern Silica Coke Oven Shapes (net ton): ysburg, Mt. Union, Sproul, Pa., Birming- n, $92.40.

ois Silica Coke Oven Shapes (net ton): et or Rockdale, Ill., E. Chicago, Ind., s, Pa., $93.50.

BASIC BRICK

net ton, Baltimore or Chester, Pa. Burned ome brick, $73-$78; chemical-bonded chrome k, $77-$82; magnesite brick, $99-$104; mical-bonded magnesite, $88-$93.

MAGNESITE

net ton, Chewelah, Wash. Domestic dead- ned, ⅝" grains; bulk, $36.30; single paper s, $41.80.

DOLOMITE

net ton. Domestic, burned bulk; Bonne re, Mo., $12.15; Martin, Millersville, Narlo, y Center, Woodville, Gibsonburg, Bettsville, Billmeyer, Plymouth Meeting, Blue Bell, liams, Pa., Millville, W. Va., $13.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950 in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56.62% concentrates contract	17.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$38-$39
Domestic scheelite, del.	nominal

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African	
48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00
South African Transvaal	
44% no ratio	$19.50
45% no ratio	20.00
48% no ratio	27.00
50% no ratio	28.00-28.50
Brazilian	
44% 2.5:1 lump	$32.00
Rhodesian	
45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $70, Palmerton, Pa.; $71, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l., packed, $197; gross ton lots, packed, $212; less gross ton lots, packed, $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $190, Chattanooga, Tenn. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227; less gross ton lots, $244 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lot 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% min., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max.). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 29c per lb of metal; packed, 29.75c; ton lot 31.25c; less ton lot 33.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: 250 lb to 1999 lb, 32c; 2000 to 39,999 lb. 30c; 40,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump bulk, 1.50% C grade, 18-20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lot 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

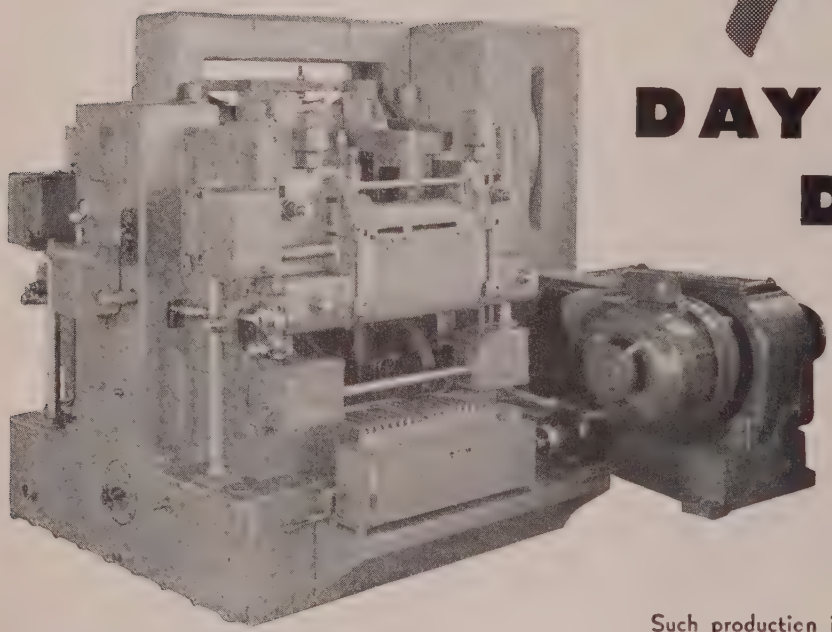
CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 21.75c per lb of contained Cr, c.l., packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%,

(*Please turn to page* 436)

500 STROKES /min.



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luminum Output Rises 19 Per Cent

1950 total is third largest on record. Aluminum Co. of America rapidly gearing for defense needs, says Roy A. Hunt, president. Civilian supplies to remain tight

tsburgh — Primary aluminum uction for 1950 is estimated by A. Hunt, president, Aluminum f America, this city, to be about ,000,000 pounds—a total ex- d only by that of 1943 and during World War II, and near- per cent higher than the 1949 ut of about 1,207,000,000 pounds.

oduction of aluminum at Alcoa's Point Comfort Works in Texas n in February, 1950. Designed roduce 114 million pounds of inum a year, this is the first inum-producing works to be ed in the United States since ld War II. Electric power re- ed for its operation is generated nternal combustion engines, us- natural gas as fuel.

ew Facilities—Two major pro- ns announced by Alcoa will boost company's production of defense inum by about 50 per cent an- ly. The first, a quick-action plan roduce aluminum for the defense kpile at the rate of about 158 ion pounds a year, is using stand- facilities and high-cost electric er. Operation of these facilities started the day after govern- t approval was received, and the delivery of metal to the stock- took place within five days.

ne second phase of the program n expansion involving erection of anent new capacity capable of ducing 240 million pounds of alu- um annually.

lso completed and placed in op- ion by Alcoa during 1950 were ew wire, rod and cable mill at couver, Wash.; a new chemical arch laboratory building at East Louis, Ill.; a bauxite ore storage transfer station at Trinidad.

eading Consumers—"Preliminary mates indicate that Alcoa's ship- nts of aluminum to various in- tries in 1950 followed a pattern ilar to that of the previous year," Hunt said, "with transportation building products in a close race leadership. A spurt in the use aluminum for building products lier in the year was matched in r months by a transportation up- ng as defense orders climbed. Al- 's shipments to industries in 1950 estimated as follows:

Building products, 19 per cent; nsportation (all forms), 18 per t; cooking utensils, 6 per cent; ver transmission conductors, 8 per t; household appliances, 8 per t; machinery (general and elec- al), 4 per cent; shipments to erwise unclassified fabricators for ther processing, 23 per cent; all er uses, 14 per cent.

The application of aluminum to itary and defense uses increased idly following the start of hos- ties in Korea at midyear. Military craft requirements are the major tor in aluminum consumption for nament. Numerous other alumi- n defense applications are in serv- or under development: The new 3.5 inch bore 'super bazooka' for launching antitank rockets, using about 13 pounds of aluminum in the barrel and other parts; aircraft landing mats; tactical and floating bridges; radar towers and equipment; helmets; rockets and launching equipment; fire control towers; portable shelters; and mess kits.

"Other significant military applications of aluminum are: 'invasion pipe' for fuel lines; containers for rocket-fuel chemicals; ships and amphibious vehicles; aircraft armor; submarines and PT boats; unloading ramps and assault equipment; water and fuel tanks; foil 'chaff' for radar defense, and for packaging food and metal parts; field kitchen equipment; small firearms; medical field chests; engine parts for tanks, trucks and other vehicles; plus a number of other products for secret projects.

Aircraft Products—"Alcoa made outstanding progress during the year in the development of rolled aluminum tapered sheet and plate for aircraft wing skin panels and structures. New magnesium alloys were developed for aircraft castings, and advances were made in the technique of casting airplane wings of magnesium.

"Aluminum for ship construction had its greatest year since World War II. More aluminum was used for building trucks, trailers, and railroad tank cars in 1950 than in any previous year.

"A new high-strength aluminum alloy rivet for heavy-duty use in such applications as bridges, railroad cars and similar aluminum structures was developed by Alcoa. Now commercially available on an experimental basis, this rivet will mean simplification of structural joints and lower assembly or erection costs."

Zinc Shortage To Continue

New York—Production of slab zinc in 1950 is estimated at about 910,000 tons by the American Zinc Institute Inc., this city, compared with 870,000 tons in 1949. Of the 1950 total, 850,000 tons were shipped to domestic consumers, 20,000 tons were exported, and 40,000 tons were shipped to the government for stockpiling. In addition, about 85,000 tons were withdrawn from smelters' stocks for the government's stockpile. This represents a record-breaking total of 995,000 tons of slab zinc shipped by U.S. smelters in 1950 against 800,000 tons in 1949. With the estimated 150,000 tons of imported slab zinc added to the domestic shipments, deliveries represent a grand total of 1,145,000 tons, reflecting the phenomenal demand for the metal which outstripped the substantial increase in supply.

To increase production involves many problems which cannot be solved quickly, the Institute points out. The shortage of concentrates and scrap is the main limiting factor. These raw materials can only be increased by long-range planning and with inducements to attract risk capital essential to the development and extraction of known reserves and the search for new deposits. Much auxiliary equipment is required to ready the charge for the reduction plants, not to mention the question of availability of handling equipment, power, fuel and labor—all of which pose particular problems that cannot easily be solved in these days of shortages.

133,000-Ton Shortage—To maintain the present rate of production, primary slab zinc producers need 850,000 tons of zinc in concentrates. In addition, about 130,000 tons are required for the manufacturers of zinc pigments, a total of 980,000 tons of the mine product. On the supply side, domestic mine production in 1950 amounted to about 617,000 tons of zinc, while imports represent about 230,000 tons of recoverable zinc. In 1950, therefore, we had a total need of zinc in concentrates of 980,000 tons and a total available of 847,000 tons, which points up the current shortage of 133,000 tons of zinc in concentrates.

"At the moment, estimates for 1951 indicate an increase from domestic mines from 617,000 tons to 660,000-690,000 tons, not enough to fill the gap," the Institute says.

"Possibility of increased imports in 1951 is hard to measure. With the price of metal in Europe above the American level and with the stringency in supplies throughout the world, the first thing to hope for is that the present rate of imports will be maintained and that something will happen to bring about an increase. . . . Development of existing reserves in the United States is handicapped by the declining tenor of the ores and the high cost of production which makes the necessary investment a hazardous undertaking and unattractive to risk capital. Again the scarcity of supplies and labor adds to the problem and, in any event, the time required for the successful development and production of reserves is a matter of years rather than months. Exploration for new reserves involves even more time and difficulty."

RFC Offers Copan Alloy

Washington — Reconstruction Finance Corp. is offering Copan alloy, the by-product of the tin smelting and refining operations carried on at the Texas City, Tex., smelter. Copan alloy is comprised of about 80 to 90 per cent tin, 10 to 15 per cent antimony, and 2 to 5 per cent copper with a lead content of less than 0.25 per cent. It is suitable for making babbitt. Current market prices for tin and antimony, less a discount in each case, will be the basis for fixing the price of Copan alloy. The pricing formula on 20-ton lots or more will be the price of Grade A tin at New York less a discount of 3 cents per pound for the tin content and the price of RMM antimony, in bulk, f.o.b. Laredo, Tex., for the antimony content. Discounts are graduated downward on smaller quantities.

For Aircraft Welding to ANW Specifications

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monel · inconel
stainless steel
other alloys
handled
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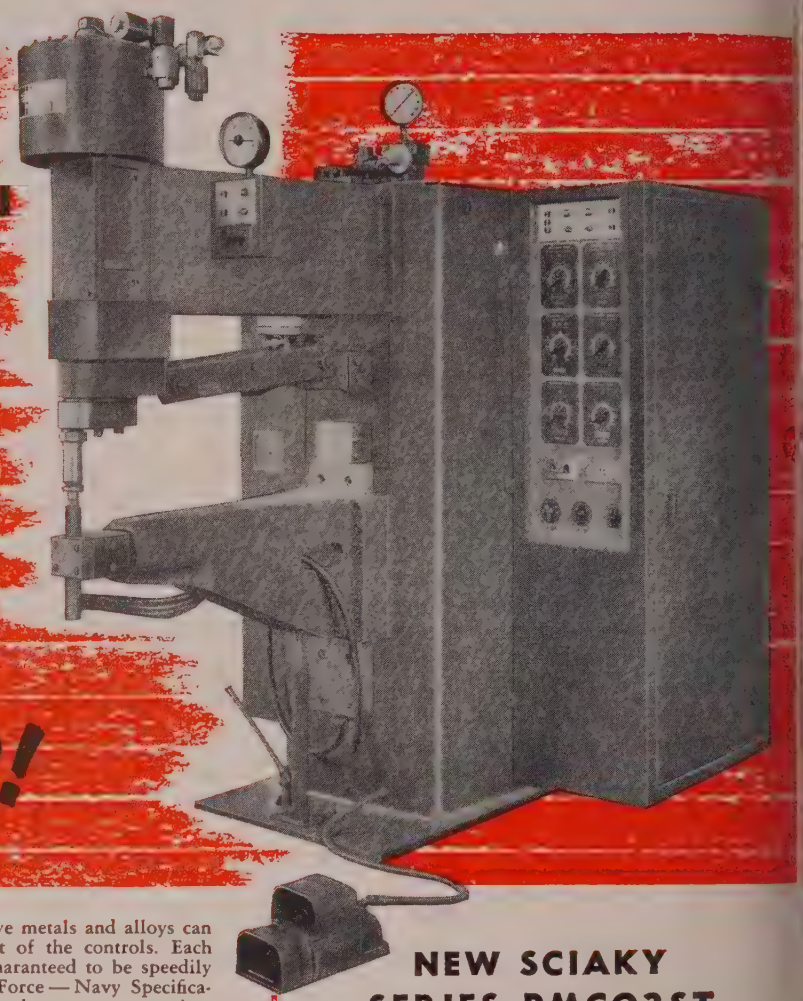

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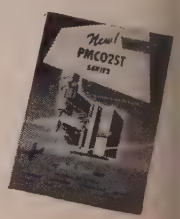

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Complete details, description of controls, features, specifications are included in Bulletin 134-ST. SEND FOR YOUR COPY TODAY.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

mary Metals

per: Electrolytic 24.50c, Conn. Valley; e 24.62½c, delivered.

s Ingots: 85-5-5-5 (No. 115) 29.00c; 0-2 (No. 215) 44.50c; 80-10-10 (No. 305) 00c; No. 1 yellow (No. 405) 25.50c.

: Prime western 17.50c; brass special 5c; intermediate 18.00c, East St. Louis; grade 18.60c, delivered.

l: Common 16.80c; chemical 16.90c; car- ng 16.90c, St. Louis.

nary Aluminum: 99% plus, ingots 19.00c, 18.00c. Base prices for 10,000 lb and . Freight allowed on 500 lb or more but in excess of rate applicable on 30,000 lb orders.

ndary Aluminum: Piston alloys 31.00- 0c; No. 12 foundry alloy (No. 2 grade) 0-31.00c; steel deoxidizing grades, notch s, granulated or shot: Grade 1, 32.50- 0c; grade 2, 30.75-31.50c; grade 3, 30.00- 0c; grade 4, 29.50-30.00c. Prices include ght at c.l. rate up to 75 cents per 100 lb.

gnesium: Commercially pure (99.8%) stand- ingots, 10,000 lb and over 24.50c, f.o.b. eport, Tex.

: Grade A, spot, prompt, 150.00c.

timony: American 99-99.8% and over but meeting specifications below 32.00c; 99.8% over (arsenic 0.05% max.; other impuri- 0.1% max.) 32.50c; f.o.b. Laredo, Tex., bulk shipments. Foreign, 99%; Chinese 0c; English, 32.75c; Belgian, 32.75c, duty d, New York.

kel: Electrolytic cathodes, 99.9%, base sizes refinery, unpacked, 50.50c; 25-lb pigs, 5c; "XX" nickel shot, 54.15c; "F" nickel t or ingots, for addition to cast iron, 0c. Prices include import duty.

rcury: Open market, spot, small lots, New k, $118-$125, per 76-lb flask.

ryllium-Copper: 3.75-4.25% Be, $30.00 per contained Be, f.o.b., Reading, Pa.

dmium: "Regular" straight or flat forms, 5 del.; special or patented shapes $2.80.

balt: 97.99%, $2.10 per lb for 500 lb (kegs); 2 per lb for 100 lb (case); $2.17 per lb er 100 lb.

ld: U. S. Treasury, $35 per ounce.

ver: Open market, New York 80.00c per oz.

tinum: $90-$93 per ounce from refineries.

lladium: $24 per troy ounce.

dium: $200 per troy ounce.

anium (sponge form): $5 per pound.

olled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

eet: Copper 39.93-41.68; yellow brass 36.86- 28; commercial bronze, 95%, 39.91-41.61; %, 39.48-41.13; red brass, 85%, 38.54-40.14; %, 38.12-39.67; best quality, 39.15; nickel ver, 18%, 50.57-51.91; phosphor-bronze ade A, 5%, 58.49-60.20.

ds: Copper, hot-rolled 35.78-37.53; cold- awn 37.03-38.78; yellow brass free cutting, 26-32.63; commercial bronze, 95%, 39.60- 30; 90%, 39.17-40.82; red brass 85%, 38.23- 83; 80%, 37.81-39.36.

amless Tubing: Copper 39.97-41.72; yellow ass 39.87-41.29; commercial bronze, 90%, 14-43.79; red brass, 85%, 41.45-43.05; 80%, 58.

re: Yellow brass 37.15-38.57; commercial onze, 95%, 40.20; 90%, 39.77-41.42; red ass, 85%, 38.83-40.43; 80%, 38.41-39.96; st quality brass, 39.44.

pper Wire: Bare, soft, f.o.b. eastern mills, 28.67-29.42, l.c.l. 29.17-29.92, 100,000 lb s 28.545-29.295; weatherproof, f.o.b. eastern lls, c.l. 29.60, l.c.l. 30.10, 100,000 lb lots 35; magnet, del., 15,000 lb or more 34.50, l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	R317-T4	—Hexagonal— 17S-T4
0.125	52.0	....	....
0.156-0.188	44.0	....	....
0.219-0.313	41.5	....	....
0.375	40.0	46.0	48.0
0.406	40.0	....	....
0.438	40.0	46.0	48.0
0.469	40.0	....	....
0.500	40.0	46.0	48.0
0.531	40.0	....	....
0.563	40.0	....	45.0
0.594	40.0	....	....
0.625	40.0	43.5	45.0
0.688	40.0	....	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	....	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	....	....
1.625	36.5	....	39.5
1.688-2.000	36.5	....	....

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq. ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 74.00c. Strip, cold-rolled, 80.00c. Rods and shapes, 70.00c. Plates, 72.00c. Seamless tubes, 103.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 58.00c. Strip cold-rolled 62.00c. Rods and shapes, 56.00c. Plates, 57.00c. Seamless tubes, 93.00c. Shot and blocks, 51.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb. 55.00-62.00c; 25 to 99 lb. 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 37.89c; oval 37.19c; cast 37.375c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 61.9c, under 1000 lb 63.9c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 70.00c; 10,000 to 30,000 lb, 68.00c; 3000 to 10,000 lb, 71.00c, 500 to 3000 lb, 72.00c; 100 to 500 lb, 74.00c; under 100 lb, 77.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl. 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.

Stannous Chrolide (Anhydrous): In 400 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Munts metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; composition red brass 22.00-22.50; radiators 17.25; heavy yellow brass 17.00.

* Nominal.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 19.50.

* Nominal

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 20.00; No. 2 18.50; light copper 17.25; No. 1 composition red brass 17.00-17.50; No. 1 composition turnings 16.50-17.00; mixed brass turnings 12.00-12.50; new brass clippings 17.50-18.00; No. 1 brass rod turnings 16.00-16.50; light brass 11.00; clean heavy yellow brass 14.50-15.00; new brass rod ends 16.50-17.00; auto radiators 14.50-15.00; cocks and faucets, 15.50-16.00; brass pipe 17.00-17.50.

Lead: Heavy 14.50-14.75; battery plates 8.75-9.00; linotype and stereotype 14.50-14.75; electrotype 12.75-13.00; mixed babbitt 12.25-12.50.

Zinc: Old zinc 11.00-11.25; new die cast scrap 10.75-11.00; old die cast scrap 8.00-8.25.

Tin: No. 1 pewter 63.00-65.00; block tin pipe 90.00; No. 1 babbitt 58.00-60.00.

Aluminum: Clippings 2S 19.00-19.50; old sheets 15.50-16.00; crankcase 15.50-16.00; borings and turnings 12.00-12.50.

DAILY PRICE RECORD

0	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
c. 20-26	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
c. 19	24.50	16.80	17.50	155.00	19.00	32.00	50.50	80.00
c. 18	24.50	16.80	17.50	147.00	19.00	32.00	50.50	80.00
c. 15-16	24.50	16.80	17.50	146.00	19.00	32.00	50.50	80.00
c. 14	24.50	16.80	17.50	142.00	19.00	32.00	50.50	80.00
c. 13	24.50	16.80	17.50	139.00	19.00	32.00	48.00	80.00
c. 12	24.50	16.80	17.50	139.50	19.00	32.00	48.00	80.00
c. 11	24.50	16.80	17.50	140.00	19.00	32.00	48.00	80.00
c. 8-9	24.50	16.80	17.50	141.00	19.00	32.00	48.00	80.00
c. 7	24.50	16.80	17.50	140.00	19.00	32.00	48.00	80.00
c. 6	24.50	16.80	17.50	142.00	19.00	32.00	48.00	80.00
c. 5	24.50	16.80	17.50	139.50	19.00	32.00	48.00	80.00

TE: Copper; Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime stern, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, k, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; ver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

IRON AND STEEL SCRAP

Consumers prices, except as otherwise noted including brokers' commissions, as reported to STEEL, Dec. 28, 1950; gross tons
Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Dec. 28	$45.50
Dec. 21	45.50
Nov. 1950	41.33
Dec. 1949	28.03
Dec. 1945	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	**$46.50**
No. 2 Heavy Melt.	**44.50**
No. 1 Busheling	**46.50**
No. 1 Bundles	**46.50**
No. 2 Bundles	**43.50**
Heavy Turnings	**47.00-48.00**
Machine Shop Turnings	**38.50**
Mixed Borings, Turnings	38.50
Short Shovel Turnings.	40.50
Cast Iron Borings	39.50-40.50
Low Phos. Steel	56.00-57.00

Cast Iron Grades

No. 1 Cupola Cast	57.00-58.00
No. 1 Machinery Cast.	67.00-68.00
Charging Box Cast	56.00-56.00
Heavy Breakable Cast.	54.00-55.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.50
Rails, Random Lengths	64.00-65.00
Rails, 2 ft and under.	68.00-69.00
Rails, 18 in. and under	69.00-70.00
Railroad Specialties	64.00-65.00

CLEVELAND

(Delivered Consuming Plant)

No. 1 Heavy Melt. Steel	**$45.50-46.00†**
No. 2 Heavy Melt. Steel	43.50-44.00†
No. 1 Busheling	45.50-46.00†
No. 1 Bundles	45.50-46.00†
No. 2 Bundles	40.00-42.00
Machine Shop Turnings	37.50-38.00
Mixed Borings, Turnings	39.00-40.00
Short Shovel Turnings.	39.00-40.00
Cast Iron Borings	39.50-40.00
Low Phos.	48.00-48.50

Cast Iron Grades

No. 1 Cupola	65.00-66.00
Charging Box Cast	53.00-54.00
Stove Plate	55.00-56.00
Heavy Breakable Cast.	55.00-56.00
Unstripped Motor Blocks	44.00-45.00
Brake Shoes	50.00-51.00
Clean Auto Cast	65.00-66.00
Burnt Cast	46.00-47.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-46.50
R.R. Malleable	72.00-73.00
Rails, 3 ft and under.	70.00-71.00
Rails, 18 in. and under	71.00-72.00
Rails, Random Lengths	64.00-65.00
Cast Steel	58.00-59.00
Railroad Specialties	60.00-61.00
Uncut Tires	60.00-61.00
Angles, Splice Bars	65.00-66.00

† Plus applicable springboards

VALLEY

No. 1 Heavy Melt. Steel	**$46.00-46.50†**
No. 2 Heavy Melt. Steel	**44.00-44.50†**
No. 1 Bundles	**46.00-46.50†**
Facty. Prod. Bundles.	**46.00-46.50†**
No. 2 Bundles	**40.50-42.50**
Machine Shop Turnings	**38.00-38.50**
Short Shovel Turnings.	**40.00-40.50**
Cast Iron Borings	**40.00-40.50**
Low Phos.	**48.50-49.00**

† Plus applicable springboards

Railroad Scrap

No. 1 R.R. Heavy Melt.	**46.00-46.50**

PHILADELPHIA

No. 1 Heavy Melt. Steel	**$45.00**
No. 2 Heavy Melt. Steel	**43.00**
No. 1 Busheling	**43.00**
No. 1 Bundles	**45.00**
No. 2 Bundles	**42.00**
Short Shovel Turnings.	**39.00**
Machine Shop Turnings	**37.00**
Mixed Borings, Turnings	**37.00**
Low Phos. Punchings and Plate, elec. fur. grade	51.00
Low Phos. Plate, 5 ft. & Under	51.00
Elec. Furnace Bundles.	**48.00-49.00**
Heavy Turnings	**45.00**
No. 1 Chemical Borings	**45.00**
Knuckles and couplers.	**56.00-58.00**
Steel car wheels	**56.00-58.00**

Cast Iron Grades

No. 1 Cupola Cast	54.00-55.00
No. 1 Machinery Cast.	58.00-60.00
No. 1 Yard Cast	52.00-53.00
Charging Box Cast	54.00-55.00
Heavy Breakable Cast.	54.00-55.00
No. 1 Wheels	**70.00***
Malleable	**74.00**

* Nominal

CINCINNATI

No. 1 Heavy Melt. Steel	$46.00
No. 2 Heavy Melt. Steel	44.00
No. 1 Busheling	46.00
No. 1 Bundles	46.00
No. 1 Black Bundles	46.00
Machine Shop Turnings	38.00
Short Shovel Turnings.	40.00
Mixed Borings, Turnings	38.00
Cast Iron Borings	34.00

Cast Iron Grades

No. 1 Cupola Cast	**70.00**
Charging Box Cast	60.00
Stove Plate	55.00
Heavy Breakable Cast.	56.00
Unstripped Motor Blocks	42.00
Brake Shoes	37.00
Clean Auto Cast	70.00
Drop Broken Cast	72.50
Low Phos., 18 in. and under	62.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00
R.R. Malleable	64.00
Rails, Rerolling	65.00
Rails, Random Lengths	65.00
Rails, 18 in. and under	72.50

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$38.25-39.00
No. 1 Bundles	*40.25-45.00*
No. 2 Bundles	*37.25-37.50*
No. 1 Busheling	*40.25-45.00*
Machine Shop Turnings	32.25-33.00
Forge Flashings	*40.25-45.00*
Short Shovel Turnings.	34.25-35.00
Cast Iron Borings	34.00-35.00
Punchings & Plate Scrap	*42.75-46.00*

Cast Iron Grades

No. 1 Cupola Cast	*59.00-60.00*
Heavy Breakable Cast.	*48.00-50.00*
Clean Auto Cast	62.00-64.00

BUFFALO

No. 1 Heavy Melt. Steel	**$44.50-45.25**
No. 2 Heavy Melt. Steel	**42.50-43.25**
No. 1 Busheling	**42.50-43.25**
No. 1 Bundles	**43.50-44.25**
No. 2 Bundles	**41.50-42.25**
Machine Shop Turnings	**36.50-37.25**
Mixed Borings, Turnings	**36.50-37.25**
Cast Iron Borings	**36.50-37.25**
Short Shovelings	**38.50-39.25**
Low Phos.	**48.25-49.00**

Cast Iron Grades

No. 1 Cupola	*54.00-55.00*
No. 1 Machinery	*59.00-60.00*
Malleable	*nominal*

Railroad Scrap

Rails, 2 ft and under.	60.00-61.00
Rails, random size	55.00-56.00
Railroad Specialties	55.00-56.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	**$38.00**
No. 2 Heavy Melt. Steel	**37.00**
No. 1 Busheling	**38.00-39.00**
No. 1 Bundles	**39.00**
No. 2 Bundles	**36.00**
Mixed Borings, Turnings	**31.00**
Machine Shop Turnings	**31.00**
Short Shovel Turnings.	**33.00**
Punchings & Plate Scrap	**41.50**
Low Phos. Plate, 5 ft & under	**41.50**
Elec. Furnace Bundles.	**41.50**

Cast Iron Grades

No. 1 Cupola Cast	47.00-48.00
No. 1 Machinery	49.00-50.00
Charging Box Cast	44.00-45.00
Heavy Breakable	44.00-45.00
Unstripped Motor Blocks	41.00-42.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$35.67
No. 2 Heavy Melt. Steel	33.67
No. 1 Bundles	35.67
No. 1 Busheling	33.67
Machine Shop Turnings	27.67
Mixed Borings, Turnings	27.67
Short Shovel Turnings.	29.50-30.00
Bar Crops and Plate.	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Chemical Borings	31.00-32.00

Cast Iron Grades

No. 1 Cupola Cast	44.00-46.00
Mixed Cast	42.00-43.00
Heavy Breakable Cast.	41.00-42.00
Stove Plate	42.00-43.00

CHICAGO

No. 1 Heavy Melt. Steel	**$45.00**
No. 2 Heavy Melt. Steel	**43.00**
No. 1 Bundles	**45.00**
No. 2 Bundles	**42.00**
Machine Shop Turnings	*35.00-36.00*
Mixed Borings, Turnings	*35.00-36.00*
Short Shovel Turnings	*37.00-38.00*
Cast Iron Borings	*36.00-37.00*
Low Phos.	52.00-54.00
Elec. Furnace Bundles.	46.00-48.00
Heavy Turnings	41.00-42.00
Cut Structurals	50.00-51.00

Cast Iron Grades

No. 1 Cupola Cast	62.00-64.00
Clean Auto Cast	*65.00-66.00*
No. 1 Wheels	57.00-58.00
Stove Plate	49.00-50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-47.00*
Malleable	73.00-75.00
Rails, Rerolling	66.00-68.00*
Rails, Random Lengths	59.00-60.00
Rails, 2 ft. and under.	68.00-69.00
Rails, 18 in. and under	69.00-70.00
Railroad Specialties	60.00-61.00*
Angles, Splice Bars.	64.00-65.00

* Brokers' buying price.

BIRMINGHAM

No. 1 Heavy Melt. Steel	$43.50
No. 2 Heavy Melt. Steel	41.50
No. 1 Busheling	43.50
No. 2 Bundles	40.50
Machine Shop Turnings	35.50
Mixed Borings, Turnings	35.50
Short Shovel Turnings.	37.50
Cast Iron Borings	28.00
Bar Crops and Plate.	46.00-47.00
Cut Structurals	46.00-47.00

Cast Iron Grades

No. 1 Cupola Cast.	59.00-60.00
Stove Plate	59.00-60.00
No. 1 Wheels	nominal

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.50
R.R. Malleable	nominal
Rails, Rerolling	60.00-61.00
Rails, 2 ft and under.	65.00-66.00
Angles and Splice Bars.	59.00-60.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$47.00-48.00
No. 2 Heavy Melt. Steel	41.50-42.50
No. 1 Bundles	46.00-47.00
No. 2 Bundles	41.50-42.50
Machine Shop Turnings	33.00-34.00
Short Shovel Turnings.	35.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	64.00-66.00
Charging Box Cast	58.00-60.00
Heavy Breakable Cast.	59.00-61.00
Brake Shoes	56.00-58.00
Clean Auto Cast	65.00-67.00
Burnt Cast	57.00-58.00

Railroad Scrap

R.R. Malleable	74.00-76.00
Rails, Rerolling	66.00-68.00
Rails, Random Lengths	59.00-61.00
Rails, 2 ft and under.	65.00-67.00
Uncut Tires	56.00-57.00
Angles, Splice Bars	66.00-68.00
Railroad Specialties	58.00-60.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	**$30.00**
No. 2 Heavy Melt. Steel	**28.00**
No. 1 Bundles	**30.00**
No. 2 Bundles	**28.00**
No. 3 Bundles	**25.00**
Machine Shop Turnings	**16.00**
Low Phos. Electric	**45.00**

Cast Iron Grades

No. 1 Cupola Cast	*40.00-46.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	**30.00**
Rails, Random Lengths	30.00

SEATTLE

No. 1 Heavy Melt. Steel	**$28.00**
No. 2 Heavy Melt. Steel	**28.00**
No. 1 Busheling	**25.50-26.00**
Nos. 1 & 2 Bundles	**25.50-26.00**
No. 3 Bundles	**22.00**
Machine Shop Turnings	**20.00**
Mixed Borings, Turnings	20.00
Punchings & Plate Scrap	40.00-44.00
Cut Structurals	40.00-44.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Heavy Breakable Cast.	38.00-40.00
Stove Plate	36.00-38.00
Unstripped Motor Blocks	33.00-35.00
Malleable	33.00-35.00
Brake Shoes	35.00
Clean Auto Cast	40.00
No. 1 Wheels	40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	**29.00**
Railroad Malleable	35.00
Rails, Random Lengths	29.00-30.00
Angles and Splice Bars	29.00-30.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	**$30.00**
No. 2 Heavy Melt. Steel	**28.00**
No. 1 Bundles	**28.00**
No. 2 Bundles	**26.00**
No. 3 Bundles	**22.50**
Machine Shop Turnings	**16.00**
Punchings & Plate Scrap	**39.00**

Cast Iron Grades

No. 1 Cupola Cast	**43.00-48.00**

Railroad Scrap

No. 1 R.R. Heavy Melt.	**nominal**
Rails, Rerolling	**45.00**

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$30.00
No. 1 Bundles	30.00
Mechanical Bundles	28.00
Mixed Steel Scrap	28.00
Mixed Borings, Turnings	23.00
Rails, Remelting	30.00
Rails, Rerolling	33.00
Busheling	24.50
Bushelings new factory, prep'd	28.00
Bushelings new factory, unprep'd	23.00
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Sheets, Strip . . .

Sheet and Strip Prices, Page 391 & 393

Pittsburgh — Revisions in Weirton Steel Co.'s extra cards covering hot and cold-rolled sheets and hot-rolled strip include the following:

Cold-rolled sheets gage and width extras advanced $2 per ton except 17 gage which is up $1; width brackets revised as follows: Over 23 15/16 to 36 in.; over 36 to 36½; and over 36½ to 46 in. Special killed quality extra is raised $4; restricted thickness tolerance, $5; and stretcher leveling not resquared extra, $6.

Item quantity extra weight brackets have been revised with applicable extras now listed for under 20,000 to 10,000 pounds, while no extras now are listed in weight brackets under 2000 pounds. Extras for intermediate quantity weight brackets were increased 20 to 30 cents per 100 pounds. General upward revisions in packaging extras also were established.

Hot-rolled sheet mill edge gage and width brackets have been revised and extras increased $2 per ton. Cutting extras were advanced $1 per ton. Special killed, restricted thickness tolerance, stretcher leveling and item quantity extras were increased the same as on cold-rolled sheets. Pickling extra was advanced $1 per ton and now applies only to widths 21½ in. and under. Heat treating extras have been increased $2 for normalizing and $4 per ton for box annealed, and are restricted to 0.60 per cent carbon maximum. Packaging extras were revised in line with new schedules for cold-rolled sheets.

Hot-rolled mill edge strip coil size extras were increased $1 per ton in widths 2 in. and under; $2 for over 2-in. widths. Pickling extras are up $1, and cut edge extras a like amount. Item quantity and special killed extra revised upward in line with hot and cold-rolled sheet cards. Closer than standard tolerance extra and manganese extras are up $5 per ton. Packaging extras were also completely revised.

New York—To date DO-rated orders for sheets and strip, in this district have not been heavy and have applied principally to shell cases and certain electronic applications. Local representatives of producers, however, report their delivery promises on DO-rated orders are becoming much more extended, indicating that while military orders in this district are not heavy there is an appreciable increase in others. In some flat products—hot narrow strip, for instance—promises on DO-rated shipments have become so extended that the material will be of little value to consumers unless something is done to change the procedure of preference. In one case a producer is booked into November on DO-rated hot narrow strip business on the basis of present minimum quota limitations.

Philadelphia—Various sheet sellers are not only supplying the minimum quotas set up for DO rated orders but considerably more as the pressure for defense needs becomes more pronounced. This is restricting commercial supply accordingly, with various commercial consumers laying plans to curtail production, unless emergency work carrying some assurance of steel supply, can be developed.

Unfortunately, DO rated orders have become well extended with such contracts being scheduled in the order of their receipt by the mills. This situation seriously points up to early need for entire revamping of the current priority system.

Cleveland—Rising load of emergency tonnage on the mills promises to force further cuts in regular consumers' quotas over coming months. February allotments are down sharply and March tonnage for civilian account will be still smaller. January output of the mills will be taken largely by defense work and carryover from fourth quarter.

High degree of uncertainty prevails in the market with respect to the status of the higher prices on steel products, including sheets and strip, effective beginning Dec. 1 last. Whether rollback to levels prior to December is contemplated by the government stabilization authorities is unknown. Producers, however, have been asked by the Economic Stabilization Agency to submit their price lists as of June 15 and Dec. 15 record.

Cincinnati—Sheet mills are pressing to reduce the carryover into January with some success but not to the extent there will be free tonnage. Each week brings tightening of first quarter supplies for unrated customers. Full weight of curtailment on zinc supply has hit galvanized sheet production severely.

St. Louis — Increased scarcity of sheets among non-rated consumers in this district is in prospect since DO tonnage limits on the mills have been boosted from 5 per cent of rolling capacity to 10 per cent. If Washington's projected petroleum program goes through, approximately one-third of Granite City Steel Co.'s capacity will be earmarked for government-certified consumers. Necessary plate output will cut deeply into hot and cold rolled sheet tonnage and intensify already heavy nonrated demand. The company has cut back production of corrugated roofing sheets 25 per cent due to federal zinc conservation orders.

Los Angeles—Kaiser Steel Corp. allocated DO rated tonnage for narrow sheets 14 to 16 in. wide as distant as June. Contrary to sheetmakers' anticipations sheet and strip requirements of appliance manufacturers are growing as inventories are strengthened against allocation cutbacks.

Semifinished Steel . . .

Semifinished Prices, Page 391

Los Angeles—Raft of troubles afflict district steelmakers. Columbia Steel Co. lost thousands of tons of finished steel through slowdowns and a wildcat strike and is currently producing 40 per cent less ingot tonnage than normally. Kaiser Steel Corp., seriously hampered by burnout of no. 1 blast furnace extended delivery on most finished steel products 4 to 6 weeks. Production difficulties caused both Kaiser and Columbia to set aside January to roll carryover on all products.

Steel Bars . . .

Bar Prices, Page 391

Cleveland—Extent of bar tonnage available to civilian goods trade over coming months will depend solely upon the volume directed to defense and other emergency channels. Steelmakers are unable to make firm commitments beyond February on other than rated tonnage, anticipating a marked increase in such orders from here on. Expectations are some rescheduling may be necessary before first quarter is far along.

Up to the present DO tonnage has not been as heavy in hot-rolled carbon bars as had been expected. This explains the recent reduction in mill set aside for rated orders to 5 per cent from 10 per cent of production. It is questionable, however, if this unfreezing of tonnage means anything to the regular trade since the mills are booked weeks ahead, and by the time they can consider additional bookings it is expected rated requirements will be substantially greater.

Pittsburgh—Increase in size extras of $1 to $4 per ton on cold-finished carbon rounds and $2 to $5 on hexagons established early in December by one interest has not yet been followed by other producers. Issuance of so-called price standards by the Economic Stabilization Agency is believed to be one major factor deterring action by other makers. Until the government's position on price ceilings is clarified little activity along this line is indicated.

Cold-finishers are operating well below capacity in some instances due to unbalanced inventories of hot-rolled bar stock. The production outlook is not promising for coming months due to steadily increasing volume of rated orders being scheduled by integrated mills. Rated tonnage booked by cold-finishers remains relatively light, although tending upward.

Boston—Dwindling allotments of steel bars to civilian users are sending more consumers scurrying for armament sub-contracts to fill shop schedules with insurance for improved steel supply. Government shops at Springfield and Watertown are farming out more assembly work, but heavier placement of armament contracts to primary contracts will open more subletting shortly. Forge shops are heavier engaged on this type of work. Both carbon and alloy schedules on rated volume extend well into second quarter at maximum limitation levels. February allocations to commercial users are lower with no improvement indicated for March.

Philadelphia — Rated requirements for hot-rolled carbon bars have not to date kept pace with similar needs for other major products. This situation can shift very quickly once demand for shell work, combat tanks and other military needs makes itself felt. Special ratings for cold-finished bars are being stepped up and this indirectly is having a bearing on hot-rolled stock. Commercial demand is highly active, inquiry being in excess of supply.

Los Angeles—Fully engaged district mills make supplies of cold-finished bars easier. Bar sellers

e supplies of semifinished steel fficient to support continued city scheduling and anticipate ving shortages. Kaiser Steel o.'s production of hot bar tonnage own 50 per cent.

bular Goods . . .

Tubular Goods Prices, Page 397

ttsburgh—Sellers are booked into and August with DO rated ton- on carbon cold-drawn seamless hanical tubing, particularly in larger sizes. Deliveries on alloy les are even further extended er present rated tonnage percent- maximum; into November and ember in a few instances. Open- in second quarter production dules generally are available for ied mechanical tubing. New price dules on pressure tubing reveal iderable spread in quotations ng producers. Relatively little d tonnage for carbon boiler tub- has been noted to date. Such age for alloy pressure tubing is nded into third quarter for er sizes, April and May on small- lassifications.

os Angeles—Kaiser Steel Corp. accepted DO rated tonnage for ull diameter pipe up to 4 in. in through February. Doubtful plies of tubular goods caused thern California Gas Co. to peg 1 new pipe program for this dis- t 30 per cent below that of 1950.

ates . . .

Plate Prices, Page 391

hicago—Defense and support pro- ms are drawing heavily upon cur- t plate production and the load l grow progressively during first rter as these programs accelerate. for the future, additional pro- ms, such as for locomotives and anded shipbuilding, hint at an ex- mely tight situation to come. A ssissippi river shipbuilder, for ex- ple, has been told to prepare for struction of 63 vessels over a ee year period. Plate fabricators booked nine months or so ahead. rrent production would be heavier re it not for the fact that opera- ns must be geared to receipt of te shipments from mills.

Pittsburgh — Producers' production edules on DO rated orders are ctically filled through March on maximum 15 per cent set-aside. e trend toward a diminishing ton- ge of plates for other than emer- ncy account likely will continue, in addition to tonnage commit- nts for the railroad freight car gram and iron ore carriers, there ely soon will be established spe- c programs for the petroleum in- stry, barge construction and oth- . Gradual increase in tonnage of t plates is scheduled for rolling strip mills. A new schedule of ras applicable to plates produced strip mills has been adopted by es & Laughlin Steel Corp. and public Steel Corp.

Philadelphia — As an increasing ume of rated tonnage is coming t, the squeeze on general commer- l buyers of plates is becoming more pronounced. Nonrated allocations for February, as recently set up, were down appreciably, and continuance of this trend is anticipated in March.

Los Angeles—Most district plate fabricators supply the non-rated petroleum industry so their DO business is small—about 20 per cent of total orders on their books. Heavy ordering and accelerated schedules by the Atomic Energy Commission is boosting demand for stainless sheet and plate. Columbia Steel Co. has accepted non-rated tonnage through March and blanked out January for December and November carryover.

Tool Steel . . .

Tool Steel Prices, Page 395

Pittsburgh—Tool steel demand has far exceeded industry's production schedules in recent months resulting in record peacetime order backlogs in some instances. Sellers' stocks are being drained rapidly despite current high production with producers operating 6 days per week and sometimes on Sunday.

Where possible, output is being increased, although availability of raw materials, notably tungsten, is a restricting influence. Delivery promises are extended 3 months on most items in contrast to 4 to 6 weeks last June.

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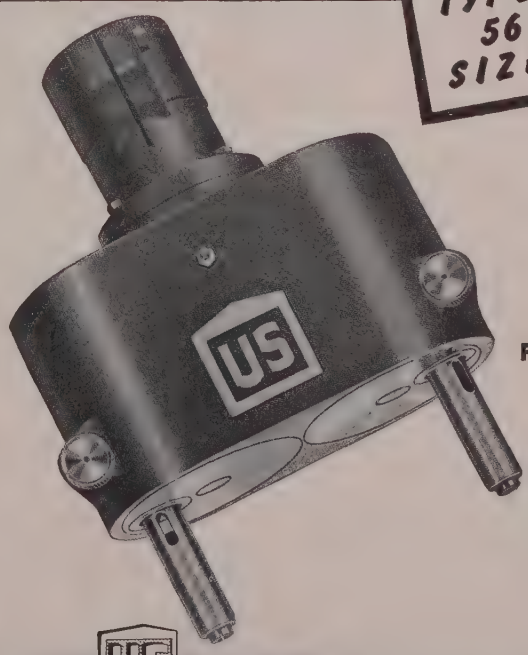

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Structural Shapes . . .

Structural Shape Prices, Page 391

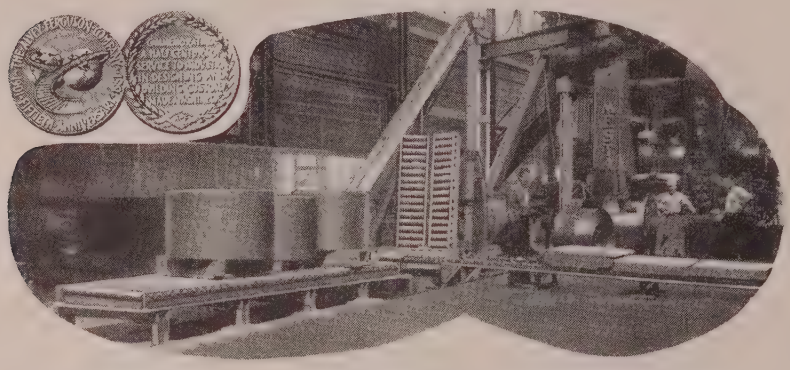
Boston—Contracts for fabricated structural steel, 100 tons or more, in New England totaled 85,325 tons in 1950. Contracts placed by contractors and engineers in this district for erection outside the area approximated 40,000 tons, mostly power plants, through Stone & Webster Engineering Corp., Boston. Inquiry for power, chemical plants and other projects connected with direct armament expansion is maintained, but other private construction is slackening due to restrictions and high prices. Some public work, including bridges, several under contract, are under review as to early completion. Extended deliveries are a delaying factor.

New York—Structural fabricators enter the new year booked many months in advance, in some cases into 1952. These schedules are based on the probability of lean quotas of shapes for non-rated work and therefore do not represent capacity operations. However, as rated requirements increase, carrying with them assurances of plain material, at least good production throughout the year is indicated, with the probability commercial work already booked will be pushed back to some extent. DO-rated work has taken a spurt.

Philadelphia—Closing of bids on a substantial volume of Pennsylvania state bridge work featured the structural market in the closing days of 1950. More such tonnage is in early prospect. General commercial work is spotty, but this lag is expected to be taken up over coming weeks with substantial contracts essential to the defense effort.

Pittsburgh—Growing shortage of standard shapes, wide flange beams and plates has restricted fabricating activity in this district. Fabricators report operations 10 to 15 per cent below the level of last summer and about 25 per cent under that recorded during the spring. An increasing volume of rated work is in the offing, which should aid fabricators in obtaining necessary steel. Programmed construction involved in projected steel mill expansions is accentuating the steel shortage.

Chicago—Fabricators of structural steel are booked nine months ahead and in face of declining supply of shapes are forced to turn away business. Only those projects that can be made to fit into schedules and with steel available are figured. Considerable business being placed at present is negotiated on a private basis.



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Reinforcing Bars . . .

Reinforcing Bar Prices, Page 391

Cleveland—Seasonal influences are adversely affecting building operations with resulting slackening in reinforcing steel demand. Changes in specifications made necessary by government curtailment orders restricting certain types of building are cause for some easing in pressure on suppliers. However, mills are heavily booked ahead and available tonnage promises to continue restricted. Whatever slack in private requirements develops is expected to be quickly taken up by defense work.

Seattle—Rolling mills are maintaining 100 per cent operations, demand for merchant and reinforcing bars, especially in small tonnages, continuing heavy. Northwest Steel Rolling Mills will close its rolling mill two weeks for overhaul but Bethlehem's Seattle plant will observe a minimum holiday.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 397

Chicago—Supply of foundry coke is even tighter than pig iron and suppliers are accommodating customers on a strict allocation basis. Fortunately shipments have been flowing uniformly and have prevented hardship to melters. Some foundries have been able to boost castings output through use of beehive coke, this being obligatory since additional oven furnace fuel is not to be had.

Refractories . . .

Refractories Prices, Page 399

Pittsburgh—General Refractories and E. J. Lavino have advanced basic brick prices $5 per net ton to offset increased manufacturing costs, including higher insurance and water rates on imported chrome ore, bulk of which comes from Cuba and

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the Philippines. The new price for burned chrome brick is $78; chemical-bonded chrome, $82; burned magnesite, $104; and chemical-bonded magnesite, $93. General Refractories Co. states basic brick prices will remain unchanged throughout first quarter.

Pig Iron . . .

Pig Iron Prices, Page 389

Cleveland—No particular easing in pig iron supply conditions is anticipated even should some cutbacks in civilian goods manufacture be experienced over coming weeks. Whatever tonnage is freed will be directed immediately to defense work which is expected to mount steadily.

Demand for castings is stronger than for many months past, and in turn the pressure on merchant pig iron suppliers is proportionately increased. So far no foundry shutdowns for lack of iron is reported though resort to greater use of scrap in melts has been necessary. Foundry melt is being pushed to the limit of available facilities and raw material supplies. Holiday curtailments were not as extensive as is usual at this season.

Whether current pig iron price schedules are subject to rollback to levels in effect prior to Dec. 1 is a matter for considerable speculation in the trade at the moment.

Pittsburgh — Some foundries recently raised castings prices 2 cents per pound to offset a 7.5 per cent increase in wages and a $2 to $3 per ton increase in raw materials since castings quotations were advanced last September.

While similar upward price adjustments have not yet been followed by the bulk of jobbing shops, such action may be taken after Jan. 1 despite the Economic Stabilization Agency's confused pricing policy.

General level of foundry activity here is at practical capacity, although raw materials shortages are seen restricting production schedules over coming months.

New York—District foundries generally worked during the Christmas week, although two long week-ends over Christmas and New Year's, respectively, cut into production. At some plants this curtailment did not prove difficult to take, as raw material supplies are scarce, especially pig iron and certain grades of scrap. Various foundries are virtually on a week-to-week basis insofar as iron is concerned, and while they are trying to augment supplies by purchase of foreign material, they are finding it difficult to obtain early delivery.

Boston—First quarter pig iron for New England consumers will be in lower bracket cost compared with most consuming points due to increase of only $1 on foundry grades by the Everett furnace. Second recent increase of $3 ton in December by most furnaces extends competitive equalization point in favor of Mystic considerably, notably with Buffalo. Supply is tightening, malleable especially, but has not reached serious stage with most shops. Melt tends upward with limited directly rated defense work involved.

Philadelphia—Due to scarcity of domestic supply, pig iron consumers are accelerating efforts to obtain foreign iron. With few exceptions, buyers are unable to obtain shipment within the next several weeks, except at substantial premiums.

Chicago—Despite the limited supply of pig iron, suppliers to the foundry trade manage to keep their customers in operation. Strict allocation is being resorted to and melters would find attempts to acquire additional tonnage futile. No foundry shutdowns are known because of iron lack but at the same time output of castings must be carefully scheduled in accordance with iron supply. High and rising prices for foundry scrap make larger use of iron desirable but impractical. Some foreign iron, including Swedish charcoal, makes its way into this area and more is to come.

Cincinnati—Demand for January shipments of foundry pig iron persists in volume far in excess of allocated supply. Recent price increases were virtually ignored by consumers in the clamor for tonnage.

St. Louis — Pig iron supplies for civilian goods manufacturers are shrinking rapidly. Reactivation of a number of old defense plants is hiking DO orders which manufacturers are extending to iron makers. Tonnage so far is moderate but percentagewise it is hitting hard a number of jobbing foundries which were already on pig iron quotas. DO inroads promise soon to be deeper still. Mounting scrap prices continue to increase pressure on iron.

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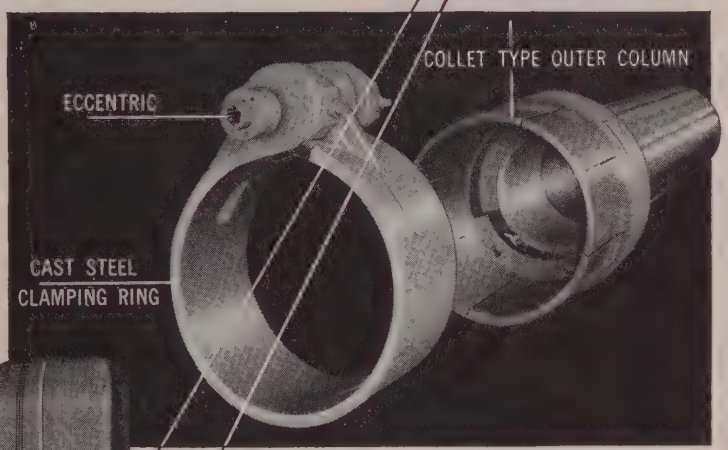

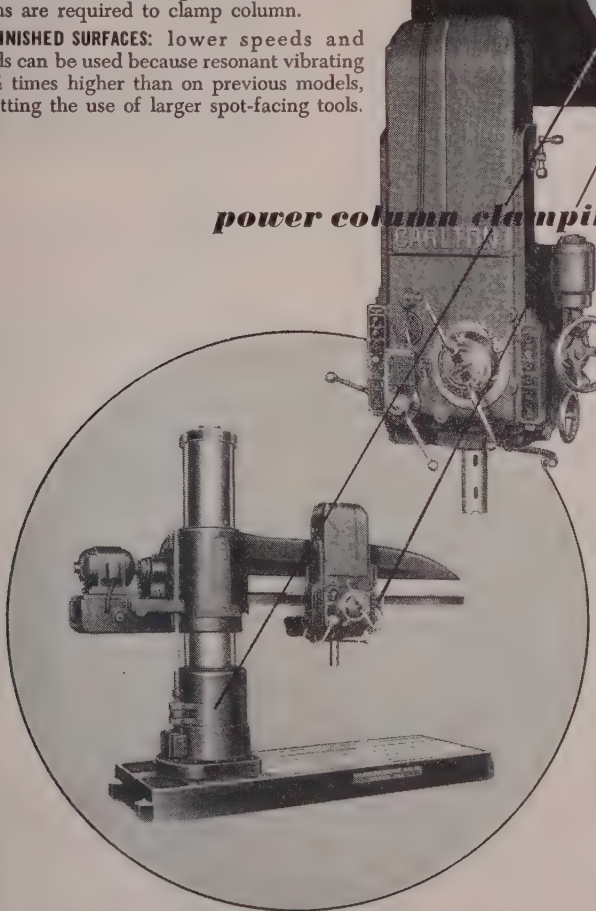

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Iron Ore . . .

Iron Ore Prices, Page 399

Cleveland—Stocks of Lake Superior iron ore on Dec. 1, totaling 41,542,602 tons, were 1,831,806 tons larger than a month previously and 3,243,867 tons larger than a year ago, reports the Lake Superior Iron Ore Association. With consumption averaging around 7 million tons per month, a shortage may develop late next spring unless an early opening of the shipping season is possible. A delay such as experienced last spring would create a critical supply situation.

The Dec. 1 total included 35,414,152 tons at furnaces and 4,623,561 tons on Lake Erie docks in the United States and 1,504,889 tons in Canada.

Consumption of Lake Superior ore totaled 6,860,823 tons in November compared with 7,415,357 tons in October and 3,527,431 tons in November, 1949. Of the November total, 6,584,903 tons were consumed in the United States, 275,920 tons in Canada.

A net gain of one in the number of furnaces in blast in this country was recorded in November, while all ten blast furnaces in Canada continued in operation. As of Dec. 1, 173 furnaces were in blast and 11 were idle in the United States.

Scrap . . .

Scrap Prices, Page 404

Pittsburgh—The usual holiday lull prevailed in the scrap market last week. Mills' stock position is satisfactory, despite unfavorable weather conditions for collection and segregation and a continuation of unusually heavy consumption. Mills are operating in excess of rated capacity. Most trade interests anticipate government price controls early this year at about the same levels prevailing under the current multiple basing point pattern. There may be some important price revisions in present grade differentials and formal price controls naturally would cover more scrap classifications than are now included under the voluntary price ceilings followed by the mills.

Chicago—Steelmaking scrap prices at yearend continued stabilized under the formula schedule revised in early December. Slight easing is noted in blast furnace and specialty grades as well as some cast items, prices being off about $1 per ton last week. Confusion exists over interpretation and implications of the voluntary price freeze calling for price rollback to Dec. 1 levels. No moves were being made or contemplated in this direction pending meeting of the steel and scrap industries in Washington early in January. Independent action on scrap hardly would be expected since steel and scrap prices are so intimately related.

Buffalo—Interest in the scrap market is focused on the possibility of price controls. Dealers continue to ship against substantial orders still outstanding which were placed within prevailing ranges. Strength dominates the cast market with latest prices on No. 1 machinery advancing $4 a ton, business being reported done within a range of $59-60.

Philadelphia — Pending something

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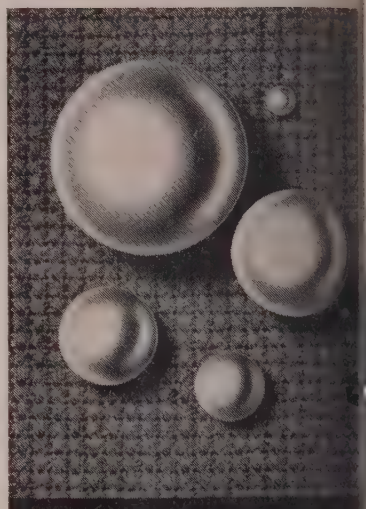

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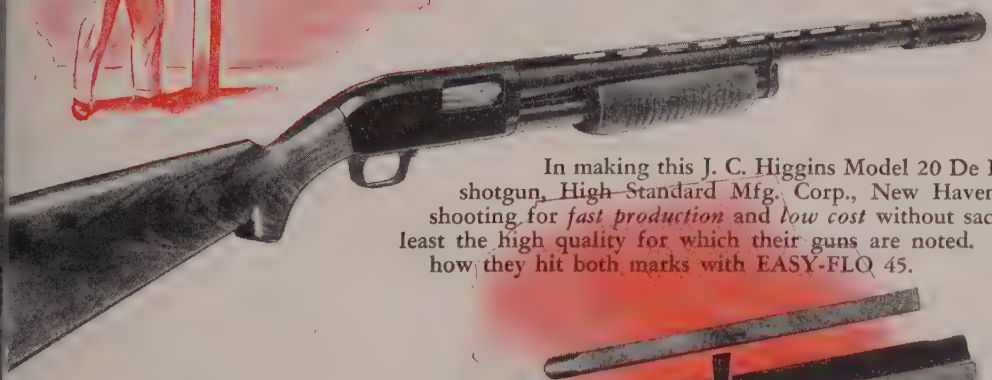

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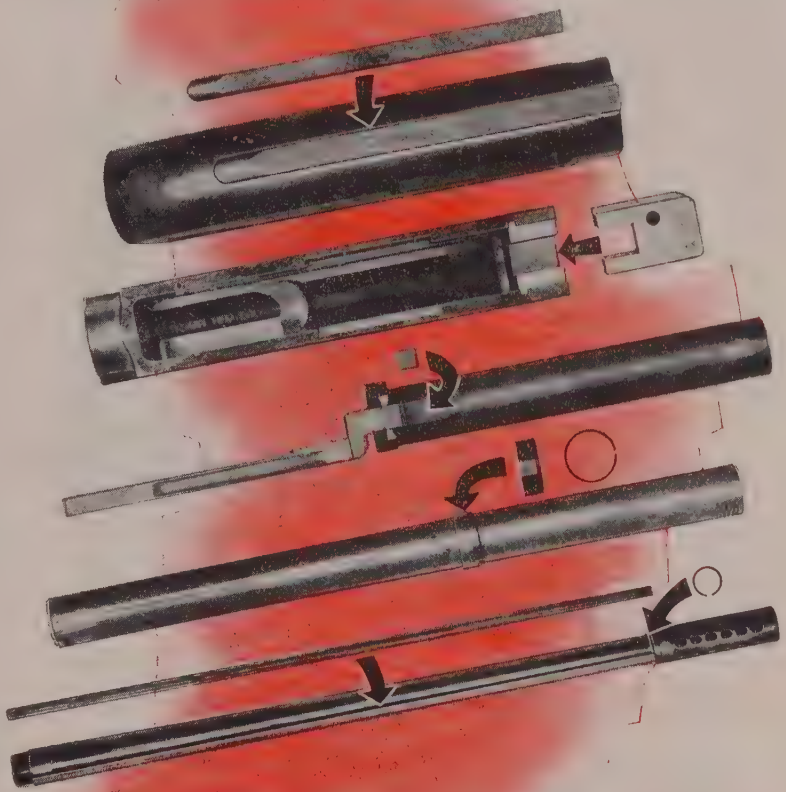
ACTION BAR brazed to FOREHAND TUBE by induction, with a piece of .015 EASY-FLO flat stock preplaced — *time 5 seconds.*

COLLAR brazed to MAGAZINE TUBE by induction, with a ring of .025" EASY-FLO 45 wire preplaced —*time 5 seconds.*

VENTILATED RIB and COMPENSATOR joined to BARREL with a length of EASY-FLO 45 flat stock staked to under side of rib, and a ring of .031" EASY-FLO 45 wire preplaced in an inside groove in compensator—all brazed in a controlled atmosphere furnace, 6 at a time in 15 minutes or *2½ minutes per assembly.*



SCORE — 5 neat, strong assemblies in a total time of 3 minutes 33 seconds — with a fraction of an ounce of alloy per joint and no finishing needed — which is good shooting when you're gunning for speed and economy.

WILL EASY-FLO 45 BETTER YOUR SCORE?

Will this remarkable low-temperature silver brazing alloy bring down metal joining costs for you, as it has for hundreds of other manufacturers? Without obligation, we'll send a field engineer to go over your work and give you the answer. Just write or call and say when. For the facts in print WRITE TODAY FOR THE NEW BULLETIN 20.

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definite out of Washington with respect to price limitations, scrap sellers are adhering generally to the price schedules of the past several weeks. This applies not only to steel grades on which formula prices have ruled, but in an important measure to cast scrap and specialties. Some clarification of the outlook may be forthcoming following a meeting in Washington Jan. 2 between government officials and representatives of scrap buyers and consumers.

New York—With the probability limits will be placed on scrap prices shortly after the turn of the year and that any further advances at this time would be greatly frowned upon by Washington, local brokers are holding buying prices unchanged. This extends not only to steel but to the cast grades and specialties as well. Another meeting with the Economic Stabilization Agency by representatives of scrap brokers and consumers is scheduled for Jan. 2. At that time the question of scrap price limits and method for setting them up and enforcing them may come in for decision.

Detroit—Free scrap is moving at lower prices, the spread between the formula and unallocating material narrowing. New automotive lists are bringing the formula prices and tonnage of free material is relatively small. Trading was slowed last week by uncertainty over future prices, but dealers were disposed to mov out as much tonnage as they coul in anticipation of a lower price leve On several grades a $2 drop from th previous "free" price was recorded a the unloading process got under way

Cincinnati—Some softening of price on cast iron scrap developed fro recent trade discussions althoug quotations remain unchanged pend ing possible early promulgation o government control policies. Stee making grades of scrap are stead at established levels, with dealer shipping steadily on contracts. Founc ry buyers are less active.

Seattle—Anticipated scrap pric controls, expected in late January have eased the market slightly, re ceipts being larger than last week although still below requirements. N further shipments of foreign scra are announced for delivery here Dealers seem more inclined to sel and thus to establish a basis whe controls are enforced. The large buyers are still openly quotin $28 for No. 1 and No. 2 heavy melt ing but admit that sales are subjec to negotiation. Deals have bee made at higher levels.

San Francisco—Scarcity of scra continues. Steel mills, maintainin full operations, have been dipping in to their stocks. Consumption cur rently is above incoming tonnage.

Warehouse . . .

Warehouse Prices, Page 399

Cleveland—Holiday influences hav served to ease the demand pressur on warehouses in this district. Sea sonal inventory-taking and uncer tainties arising from Washington po licy with respect to economic mobil ization also are factors tending t curb demand.

Limited and unbalanced inventorie will continue to restrict warehous order volume indefinitely since mo sellers see little prospect of improv ing their supply position despite th priority rating they hold with th mills.

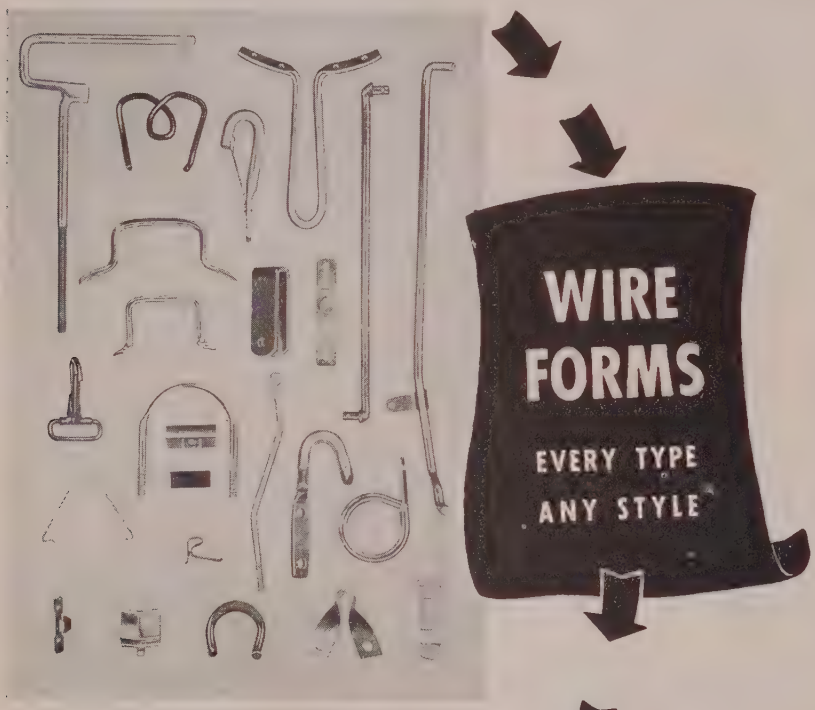
Chicago — For the first quarte steel warehouses may not fare to badly under NPA directive M-6 i obtaining supplies of the variou products from mills. However, a defense and support programs buil up in volume, the tonnages whic can be shipped to warehouses wi taper off markedly. Stocks are be ing further depleted.

Cincinnati—Stocks of warehouse are down to a level where consider able proportion of business is don as quickly as mill shipments arrive Critical shortages are reflected b the insistent demands of customer

Rails, Cars . . .

Track Material Prices, Page 395

Chicago—The railroads are unde stood to have placed orders coverin rail and track accessory requirement for 1951. The degree to which sup pliers can fulfill commitments wi be determined by steel supply an ratings accorded the carriers. Sup ply of tie plates is proving critica the situation being materially affec ed by one steelmaker closing dow its plant in the East devoted to thi item.



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talytic unit renders gases npoisonous and odorless, kes place of standard muffler

often have you been concerned the safety of the obnoxious s exhausted from gasoline-pow- industrial materials handling s? This problem has been solved the recently developed OCM Cat- Exhaust unit produced by Oxy- yst Manufacturing Co., Inc., e, Pa.

talled like any standard exhaust, nit renders exhaust gases non- nous and odorless, thus eliminat- ne of the major indoor hazards s fork lift truck operation. This complished by a built-in catalyst. sted and proved for long life on ine fork and lift trucks, the de- can be adapted to any type lift and is easily installed in place e standard muffler requiring ap- mately the same amount of . It weighs approximately 25 to unds.

ficiency and safety of its opera- is guarded by a pyrometer in- d on the instrument panel. When emperature is in the indicated range" the unit is operating actorily. The pyrometer also ures the air-fuel ratio of the en- thus enabling the operator to a constant check on engine ef- cy. High temperatures indicate mixtures—excessive fuel con- tion—or that the engine is burn- xcessive oil.

more back pressure is imposed e engine than with a standard ler. Its housing is constructed of ed steel box-sections bolted to- r. The catalyst itself, is very e physically and chemically. For mum efficiency it is recom- ed that the catalyst be replaced three thousand hours of oper-

importance is the fact that the e operates only on unleaded gas- thus making it entirely safe side factory use. Unleaded gaso- is readily available everywhere.

les Increase Fire Protection

ectional valves installed in a n dioxide fire extinguishing in- tion make it possible for any to protect several hazard areas 24-hour basis with a single e of extinguishing agent. As as 25 separate hazardous lo- ns have been protected with one n dioxide cylinder bank.

hen the detector in such a sys- a development of Walter Kidde ., New York, picks up the first l of fire in any hazard space, it actuates the directional valve controlling the group of cylinders guarding that space. A mechanical linkage, between the directional valve and the correct group of cylinders in the supply bank, opens the release valves on the heads of these cylinders.

Under its own power the carbon dioxide moves through the discharge piping, is directed to the space in danger and is discharged from the nozzles. Expanding to 450 times its stored volume, it floods the space in danger and smothers the fire by excluding the oxygen. The multi-space extinguishing system usually includes automatic controls to close doors, windows and ventilating dampers, sounds an alarm and operates switches to shut off electrical machinery.

Water Act Prepared for States

A model Water Pollution Control Act for adoption by the various states has been prepared by the United States Public Health Service, Washington, and is ready for submission to state legislatures. It would put water use under a single agency in each state.

The agency would determine limits of permissive waste discharges into

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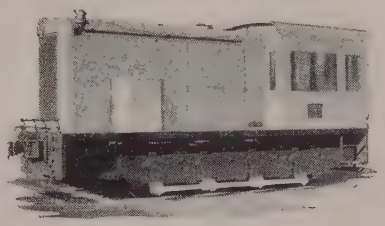
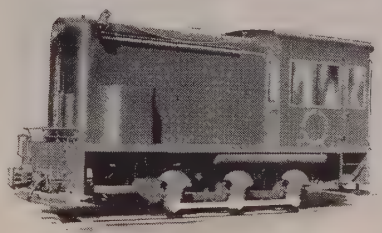
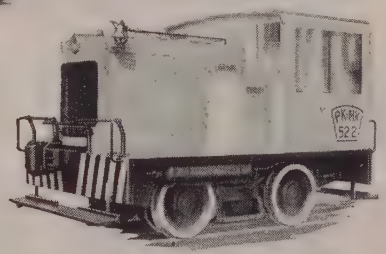




at

LOWEST TON-MILE COSTS



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streams, and permit such discharges only under individual permits. A ban of interest to the metals industries would prevent discharge of heated water containing insufficient oxygen to support fish life or stabilize discharges of waste. The philosophy underlying the model act is that living requirements and the needs of industries must not be ignored but that resulting stream pollution must be held within safe limits.

Air Contactor Has High Rating

Extension of ratings of the high voltage air contactor line for general alternating current motor applications up to 2500 hp at 5000 v or 3000 hp at unity power factor is announced by Allis-Chalmers Mfg. Co., Milwaukee.

The new rating of 25,000 amp for 30 cycles through current now makes it possible to use air contactors in conjunction with backup breakers rated up to 25,000 amp interruption capacity or 150,000 kva at 4160 v and 100,000 kva at 2300 v.

It is said that the new contactors can safely pass 54,000 amp peak making possible use with noncurrent limiting fuses rated at 250,000 kva at 4160 v. It can also be used without back-up protection where system faults cannot exceed 50,000 kva.

Giant Castings Pose Problems

Solution of an unusual problem in logistics, along with complex problems of engineering design, pattern making, coring, and molding, is reported by Erie Forge Co., in production and delivery of three huge cast steel turbine runners said to be the largest ever cast in one piece.

Completed in the company's Erie, Pa., plant, the last of the three massive turbine runners, or water wheels, recently was shipped to Newport News Shipbuilding & Dry Dock Co., Newport News, Va., for final machining and installation in three hydroelectric turbine units for a new power plant on the Roanoke River. Delivery, however, entailed some extraordinary transport provisions.

Each of the giant steel castings weighs 165,000 pounds; diameter is 17 feet 4 inches. Because of their size, both as to diameter and length, shipment by rail presented unusual difficulties due to necessary clearance requirements along railroad right-of-way. But unlike the unhappy professor who built an over-size boat in his basement, engineers co-operating with the Pennsylvania Railroad improvised an effective method of transportation between Erie and Newport News.

The problem was solved by use of two flat cars with a structural steel cradle between them, with the ends of the cradle resting in the centers of the cars and the castings suspended in the cradle between.

Loaded in this manner, with its lowest point only 6 inches above the rails, each of the giant castings towered to a height of 17 feet 10 inches, representing the maximum clearance level over the route to be traveled. Width of each shipment, including the cradle, was 11 feet 9½ inches, which was in excess of normal allowance for width of load, because of permanent structures along the right-of-way. Due to these extremes, the shipment consequently was moved as a special train during daylight hours, at a maximum speed of 15 miles per hour.

Construction of the Roanoke River plant and electric generating units, known as the Buggs Island Reservoir Project, is being carried out under the direction of the United States Army, Corps of Engineers.

If You Have Axes to Finish

Developed for surface finishing of small metal products, such as pliers, wrenches, pocket knife springs, axes

THE OLD LAFAYETTE GETS A LIFT

with a

BEDFORD 15-TON CRANE

When this B.&O. locomotive, the Lafayette, was built back around 1857, all the wealth in the world could not have bought an electric crane. Today the Bedford Foundry & Machine Co., for an unusually mild price, will build electric cranes for anybody; cranes of 5 to 150 ton capacity, any span or lift, and designed to meet your special requirements. We also make structural steel, steel buildings, steel derricks and gray iron castings. Send today for our new catalog.

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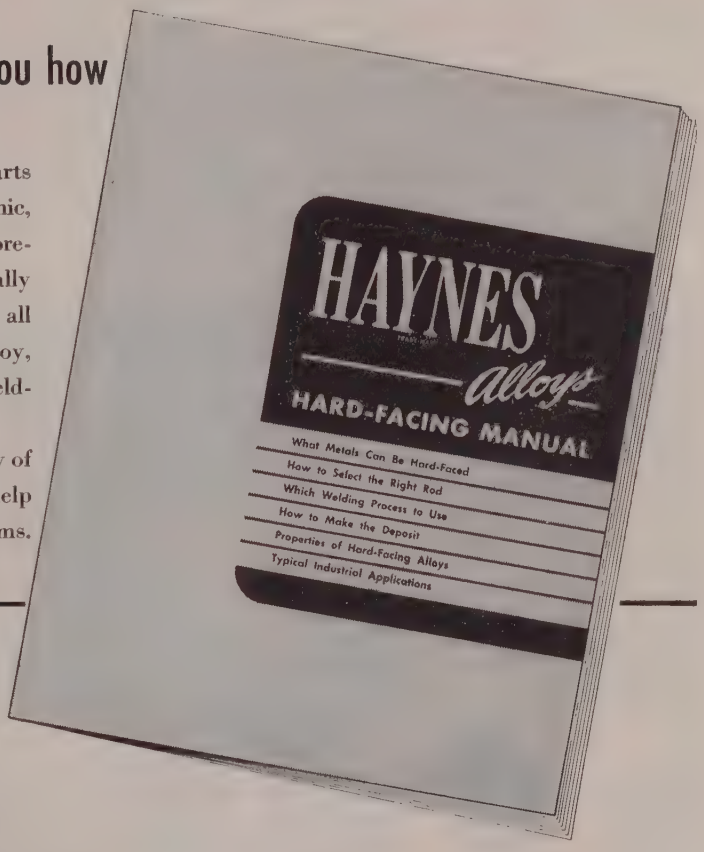
Every manufacturer or user of metal parts . . . every welding engineer, master mechanic, maintenance superintendent, and plant foreman . . . should have a copy of this really *complete* booklet on hard-facing. It takes all the guesswork out of choosing the right alloy, the right welding process, and the best welding procedures for applying the rod.

Use the coupon below to order your copy of this 40-page booklet. You'll find it a big help in solving most of your hard-facing problems.



Here is What's in it—

Which Metals Can Be Hard-Faced—

A 2-page chart listing 21 metals... and recommending suitable hard-facing rods for each.

How to Select the Right Rod—

Factors to consider in making your selection and a comparison of the characteristics of hard-facing deposits.

Which Welding Process to Use—

Where and why to use oxy-acetylene, metallic-arc, HELIARC, mechanized oxy-acetylene, or UNIONMELT welding for applying hard-facing materials.

How to Make the Deposit—

Detailed, step-by-step instructions for applying HAYNES hard-facing alloys by both the oxy-acetylene and metallic-arc welding processes.

Properties of HAYNES Hard-Facing Alloys—

Description, properties, and available sizes of 12 hard-facing materials.

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Please send me, without obligation, a copy of the new booklet, "HAYNES Alloys—Hard-Facing Manual."

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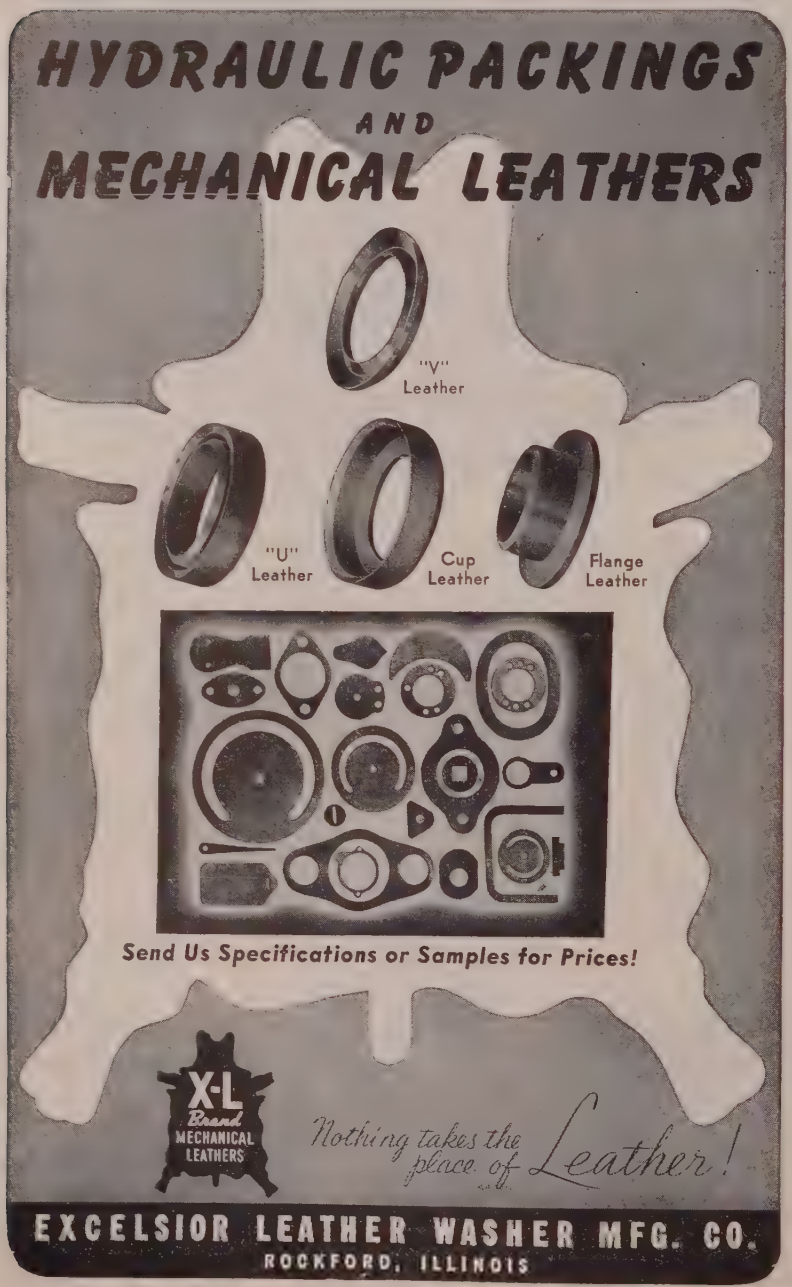
and hinges, where requirements dictate precision grinding is a single spindle surface finishing machine which can be equipped for either mechanical or magnetic holding.

Actuated by an electro-hydraulic system, the machine, made by Clair Mfg. Co., Olean, N. Y., uses a single spindle upon which a roll 40 inches wide may be mounted. Automatic hydraulic in-and-out-stroke is adjustable from 0 to 24 inches, with a maximum holding and working area of 24 x 38 inches. An air circuit is said to provide a float of buff at any predetermined uniform pressure.

Grind Wheel Bond Ups Output

An increase in grinding and finishing output of 5 to 10 per cent may be expected from the use of grinding wheel and mounted wheels using a vitrified bond developed by Chicago Wheel & Mfg. Co., Chicago.

Called 79E, the bond is said to be suitable for portable grinding of billets, brake drums, forgings and forging dies, various types of castings and stainless steel welds. It is reported to assure a smoother, faster cutting action for vitrified grinding wheels operating at speeds up to 6000 surface feet per minute. Another advantage of the vitrified bond is toughness, making wheels resist breakdown longer.



Gages Control Coal Plant

Dewatering filters at H. C. Frick Coke Co.'s Robena mine aid in producing 13,000 tons daily

AUTOMATIC control of ten centrifugal dewatering filters for fine coal and slate in the coal preparation plant at the Robena mine of H. C. Frick Coke Co. is provided by a new type of load-sensing unit. These units, consisting of cantilever load-beams to which resistance wire strain gages are bonded, respond to any desired change of force between 0.5 and 1000 pounds, depending upon the size of beam and sensitivity required.

Eight Bird centrifugal filters handle 300 tons of coal per hour in particle sizes up to ¼-inch at the Robena mine. Two more separate water from 40 tons per hour of slate in the same size range.

The mine and preparation plant, one of the largest in the world, produces an average of approximately 13,000 tons of prepared coal daily for plants of U. S. Steel. Considerable quantities of slate, sulphur and other refuse in the coal must be removed to make the coal suitable for the production of metallurgical coke.

Torque required to operate each separator, driven by a 150-hp motor, transmits a push against a Baldwin SR-4 load-beam by means of a vertical arm extending down from one end of a horizontal shaft at the end of the machine. The arm is retained loosely by a clevis clamped on one end of the load-beam. The load-beam is supported by a bracket extending out from the base of the machine.

Push of the arm strains the outer fibers of the beam on which the SR-4 strain gages are bonded on both sides, stretches or compresses the wires of the gages, and changes their electrical resistance. This change of resistance is transmitted a considerable distance to a Foxboro Dynalog recording controller from which it is translated and recorded as pounds of load, thus showing the conditions under which the separator is operating at all times.

If the filter load exceeds a set value, such as 300 pounds or 15 per cent above normal, as measured by resistance changes in the SR-4 gages, the feed is cut off automatically until the machine has cleared itself. If the load continues to increase, however, beyond a maximum safe value, not only is the feed cut off but the machine is stopped. It is also stopped

matically if the torque load be- es zero, as when a shear pin ks in the drive.

Miling Cuts X-Ray Cost

By milling x-ray penetrometers from a single block of metal, General Electric X-Ray Corp., Milwaukee, Wis., has realized a considerable reduction in price and increase in accuracy in the unit. They were formerly made of stepped layers of aluminum fastened together to form a single unit. By simplifying manufacture through the new machining method, a price cut of more than 50 per cent was made.

Penetrometers are used to check the radiographic calibration of x-ray machines, to insure that they are operating properly and also to test the performance of the machine under varying techniques. For this reason it is necessary that a finished product be as accurate as possible.

New Tiering Method

Conventional wood pallets used your plant can now be quickly apted for tiering by use of a few ple parts known as Palteam, a ent development of Paltier Corp., icago.

Described as a pair of tiering horses ich may be assembled to any stand- l 3-stringer wood pallet, the sys- n utilizes four sturdy, one-piece ket assemblies which are permaently secured near the pallet corners th three lag screws for each asmbly. This is done only once for ch pallet and thereafter no work this nature is necessary. Posts of e required length and strength slip into these sockets and two cross- rs slip-fit over the post tops.

This is all that is necessary to ansform ordinary wooden pallets in- stacking pallets, and at any time becomes advisable to dispense with e stacking feature the pallets can quickly reconverted to their origil form by unscrewing and removg the socket assemblies.

Paltier's engineers maintain the stem's extreme simplicity and ease erection make it as necessary for y storage or warehousing operation the pallets themselves. It provides strong, durable stacking support, is ceptionally flexible, and may be ickly adjusted for any type of crushable or odd-shaped material by simply changing the post length. Three different post strengths are available in all lengths for light, medium or heavy loads. It is readily disassembled and stored. The pallets with socket assemblies attached are easily piled upon one another, and the component parts take only a minimum amount of space.

Other advantages are its flexibility, ease of assembly and storage, and of course, the fact that it transforms present wood pallets into sturdy and enduring stacking pallets thus increasing usefulness and service.

Controls Grain Size

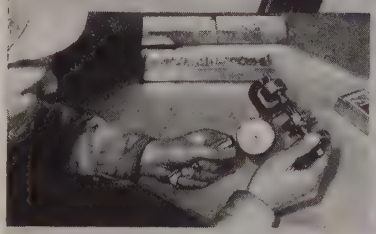
Viking Copper Tube Co., Cleveland, controls grain size to a remarkably close tolerance of plus or minus 0.05 mm since the installation of an all-electrical heated annealing furnace. According to Viking engineers, even distribution of electrical heat together with the exact control of time and temperature assures a uniform anneal for seamless copper tube.

Designed and manufactured by General Electric, the roller-hearth furnace has a maximum operating temperature of 1600° F.

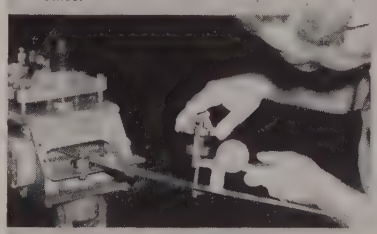
Ames HARDNESS TESTERS
are on the job everywhere!

READ DIRECTLY IN
ROCKWELL HARDNESS SCALES

MODEL 4
For testing rounds and flats up to 4 inch capacity, in Rockwell A, B and C scales. Also made in 1 and 2 inch capacities.



Testing hardness of babbitt metal with Model S reading in Rockwell N and T scales.



Testing strip steel before fabricating — an important operation that insures against defective materials.

You'll find Ames Portable Hardness Testers being used in warehouses, machine shops, schools, on the production line, and in the field — where accurate, on-the-spot, time-saving hardness tests have to be made. No specimens to be cut off — no waiting for laboratory tests — because Ames Testers are light in weight and are carried to the work.

Ames Hardness Testers are used to determine machinability and workability of rods, strip and sheets before fabricating to prevent undue machine wear or tool breakage resulting from excessive hardness. They also are used on saws, knives, gears and large parts. A practical trouble shooter for any plant. No skill required to get accurate results. Testers come in convenient carrying cases.

More than 1500 in use.
Send for descriptive bulletin.

AMES PRECISION MACHINE WORKS
WALTHAM 54, MASS.

TIPS ON MACHINING Stainless Steel for Higher Production AT LOWER COST

Page B-3

AUSTENITIC STAINLESS STEELS (Cont.)

WIDE VARIANCE IN MACHINABILITY

Types such as 303 are considered free-machining 18-8 grades, while various other 18-8 grades such as types 321 and 347 are extremely difficult to machine. These latter types are especially serviceable at elevated temperatures and will be found to be used frequently for aircraft parts, particularly jet engine parts where extremely high heat may be encountered, and high strength is essential.

CUTTING FLUIDS FOR AUSTENITIC STAINLESS STEELS

For the machining of all grades of stainless steel the presence of active or effective sulphur in the cutting fluid in varying amounts is vitally important as this quality tends to reduce the work-hardening characteristics and tendency of these materials to pick-up and weld to tool surfaces.

DATA!

It should be pointed out that the severity of the machine operation has a direct bearing on cutting fluid application. Operations such as tapping, threading and broaching where slower speeds and heavier cuts are usually in evidence, require a cutting fluid high in active sulphur and factors of lubricity.

Generally speaking, however, the free-machining grades of austenitic stainless steel demand a balanced amount of active sulphur while types such as 347 require the maximum possible amount to prevent chip weld and provide smooth finishes.

STUART'S ThredKuT 99 FOR STAINLESS

A Wisconsin manufacturer recently tried twelve different heavy duty cutting fluids for the tapping of type 310 stainless steel. One of the oils that failed sold for 45c per pound. Production with the best of these products amounted to 50 holes per tap. With Stuart's THRED-KUT 99, production was increased to 550 holes per tap.

PROOF!

D.A. Stuart Oil Co.

2735-37 S. Troy Street, Chicago 23, Illinois

width is 5 feet. Furnace sections are composed of a charging vestibule, heating chamber, cooling zone and a discharging vestibule.

Cooling zone is equipped throughout its entire length with a water jacket. Continuous movement of work through the furnace is accomplished by 80 driven rollers spaced on 12-inch centers; 6500 cubic feet of atmosphere is used per hour. This controlled atmosphere is generated by two units, one operating at 4000 cu ft per hour, the second at 2500.

Straight lengths of copper tube 3 feet long are charged directly on the rolls. Tubes in coils or lengths less than 3 feet are charged on Inconel trays. Normal operating temperatures range from 1000° to 1350° F.

Automaker Aids Research

Research projects aimed at better food preservation, improvement of metal surfaces and finishes, and health are being helped along by an automaker. Nash-Kelvinator granted $100,000 to the University of Michigan for its Phoenix project in atomic research. George W. Mason, president, said: "As a manufacturer of food preparation and preservation equipment we attach importance to the university's investigation of the use of radioactivity in the preservation of food. Recent evidence shows that bacteria and molds in foods as well as various other materials can be eliminated by radiation.

"A second major interest . . . is finding additional methods for lengthening the usable life of metal parts and surfaces. The use of radioactive tracers in testing metal, paint, oil, plastic and other types of finishes and coatings shows great promise," he said.

Coast Industrialists Gloomy

California manufacturing executives are not so sure their business in the first three months of 1951 will be as good as it is at present.

This was revealed in a quarterly poll of executive opinion conducted by the California Manufacturers Association.

They also express uncertainty over the maintenance of employment at the present high level.

More than half the manufacturers polled—54 per cent—expect their output in the coming three months to be curtailed. The vast majority of the 54 per cent fears materials will be controlled, creating shortages for some manufacturers. A fraction of the 54 per cent bases its fear in credit restrictions.

An indicated 29 per cent of Cali-

UY FROM STOCK TODAY START FORGING TOMORROW

NO BOILER

NO FUEL

NO PIPING

NO COMPRESSORS

NAZEL HAMMERS

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Put the Nazel where you need it. Plug it in. Start working!

We've tried to be ready; to keep pace with the changing times. That's why Nazel Hammers (1 to 4B) are in Stock.

LOBDELL UNITED COMPANY

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cat nap's unaffected... his plant's protected

Here's real peace of mind! He knows that fire from a short circuit, a stray spark, a forgotten cigarette or spontaneous combustion can't destroy his investment in materials, equipment and buildings. His plant is protected with modern, approved C-O-TWO Fire Protection Equipment.

For instance, with a C-O-TWO Combination Smoke Detecting and Fire Extinguishing System you have a 24 hour a day automatic fire watchman. The first whiff of smoke in a protected area sounds an alarm. Then fast, clean, non-damaging, non-conducting carbon dioxide blankets the fire, putting it out in seconds, before it spreads and causes extensive damage . . . no lingering odors, no water damage with carbon dioxide.

There are areas in your plant that particularly need C-O-TWO fast, positive fire protection: record vaults, store rooms, spray booths, dip tanks, solvent baths, electrical equipment enclosures, lift trucks, pump rooms, especially anywhere there's danger of flammable liquid or electrical fires. The longer you wait to adequately protect these fire hazardous areas, the greater are the chances of a costly fire cutting into your profits.

Whatever your fire protection problem, let an expert C-O-TWO Fire Protection Engineer help you in planning complete and up-to-date fire protection facilities now. Write us today . . . tell us about your particular fire hazards, our experience is at your disposal . . . no obligation of course.

C-O-TWO

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C-O-TWO FIRE EQUIPMENT COMPANY

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Sales and Service in the Principal Cities of United States and Canada

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Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers

Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems

Built-In Smoke and Heat Fire Detecting Systems

fornia's manufacturers expect to reduce their payrolls.

November figures place California's manufacturing employment at 825,900 workers. This was 128,000 above November, 1949, but down 12,400 from October, reflecting seasonal losses in food processing, lumber and apparel.

Nearly 80 per cent of the year to year increases was in durable goods industries, including metals, machinery, electrical equipment, aircraft and similar fields.

Pension Funds in Seven Trusts

Pension plans for General Motors' hourly-rated employees and the non-contributory part of the retirement program for salaried employees have been trusteed in separate funds. Each fund is allocated to seven trusts managed by: Chase National, Guaranty Trust and J. P. Morgan of New York; Mellon National of Pittsburgh Old Colony Trust of Boston, National Bank of Detroit and First National of Chicago.

YS&T Grants Pay Boost

Youngstown Sheet & Tube Co has given its clerical and salaried and plant protection employees an 11 per cent raise, with a minimum raise of $22 a month.

The raise for the salaried employees applies to those drawing up to $10,000 a year. Raises for those drawing over $10,000 a year will be given on an individual basis, company officials said. Negotiations between the company and United Steelworkers of America, C.I.O., which negotiated for clerical help in its ranks, was completed recently.

Social Security Booklet

"Your New Social Security" is the title of a 30-page booklet available from the Social Security Administration, Washington. The booklet shows what the Social Security Act amendments of 1950 mean, in terms of old-age and survivors insurance, to those now included under the law.

Industrial Health Unit Started

General Motors and the University of Michigan established an Institute of Industrial Health at Ann Arbor. Of a $1.5 million grant by GM $500,000 will be used for equipment, and $100,000 a year for ten years will go for research and to meet the expenses of fellowships, scholarships, added faculty, a clinic and refresher courses for personnel.

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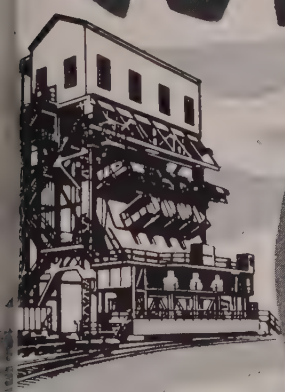
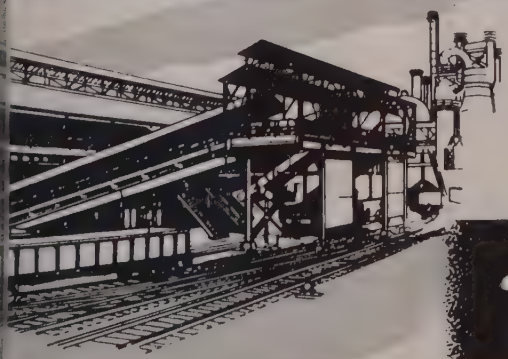
12. Special Materials handling Equipment





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Knurling of Socket Screws originated with "Unbrako" in 1934.

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Cold Extrusion Findings Aired

New information on the cold extrusion of steel is described in the current issue of the Technical Reports Newsletter, Office of Technical Services of the Department of Commerce reports.

Among the new findings on cold extrusion is the discovery of an additional lubricating step that materially increases the efficiency of this process. Copies of the letter, December, 1950, issue, are free from OTS, Washington 25 or from Commerce field offices.

Steel Does Good Allocation Job

T. S. Petersen, president of Standard Oil Company of California, credits the steel industry with doing a good job of allocation. Standard's steel needs have been supplied to date, he said in San Francisco. "The steel industry," he said, "recognizes the importance of oil."

On oil supply, the Standard Oil Company of California president declared "the current crisis finds the nation's petroleum industry in excellent condition to supply both civilian and military requirements."

Westinghouse Expands

Westinghouse Electric Corp. will build a $9 million plant adjacent to the Friendship International Airport, Baltimore, to produce electronic airplane equipment, including radar.

To be completed late in 1951, the facility will employ about 2000. Westinghouse already has two plants in Baltimore which produce electronic and x-ray equipment.

McGraw Gets Ford Contract

F. H. McGraw & Co., engineering and construction firm, was awarded a contract by Ford Motor Co. for installation of machinery and equipment at Ford's new Cleveland engine plant. The contract, one of the first mechanical erection contracts to be awarded at the new plant, amounts to nearly $500,000. In 1948 McGraw installed the production equipment in Ford's new assembly plant near St. Louis.

More Defense Business

A few more defense contracts have come to light. Ternstedt Division of GM got its first order for fire control instruments. The devices will be made in part of the GM Detroit transmission division plant. It is

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✓ Production Line Proved
for metal products requiring a protective coating with resistance to extreme high heat.

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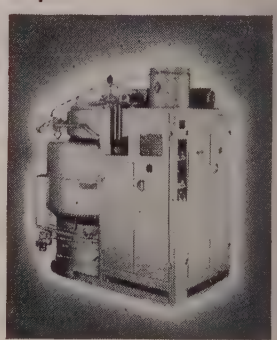
The Vapor Clarckson Steam Generating Unit is a case in point—



☆ This unit has inside temperatures of up to 3,000° (F.) and develops full capacity in two minutes to deliver 1,000,000 b.t.u. A rugged finish is necessary to protect it not only against heat, but also against the corrosive and deteriorating influences of dirt, grime, oil, and climatic elements. SICON Aluminum is used because it answers these exacting requirements. Due to its quick drying it can be handled minutes after application. Write today for *latest tech data* describing many other SICON applications.

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being tooled up. An additional -2000 employees will be needed.

McBrian, formerly assistant di- or of product engineering for stedt, will be resident manager nstrument manufacture.

nick is slated to become a prime ractor on a multimillion dollar rnment order for cross-drive transmissions.

illys-Overland, meanwhile, for third straight month, made more s for the Army than its quota s for. Ward M. Canaday, Willys' ident and chairman, estimates by April its military jeep out- will be 200 per cent higher than present monthly rate.

hrysler has brought out an am- nce for civilian defense and other aid uses. Combining the utility passenger features of the Chrys- Town and Country wagon and nted on the Royal chassis, the ve- e can be used as a four-door six- senger administrative car, or with rear seat folded will hold two apsible stretcher-cots. For ease loading the tailgate opens flush h the floor, and an unbroken floor ce of nearly ten feet from the k of the driver's seat is provided.

cuum Cleaner Sales Dip

eflecting the tightening of gov- mental credit restrictions on the sumer buying of household vacu- cleaners, factory sales of stand- -size models in November dropped 265,310 units compared to 331,445 October, a decrease of 20 per cent, s the Vacuum Cleaner Manufac- ers' Association, Cleveland.

oads Won't Bear Defense Load'

he "sorely inadequate" highway tem came in for a good going r from Col. J. G. Vincent, retiring e president of Packard Motor Car

At a reception honoring him and roy Spencer who succeeded him the end of the year, Col. Vincent rned that "our roads will not meet defense job ahead satisfactorily" ess there is prompt improvement road building and traffic control. e power and safety engineered into lay's cars far exceeds the capacity the road system to carry them.

lis-Chalmers Hikes Wages

Allis - Chalmers Mfg. Co. has osted wages for its 31,000 employ- s in nine plants throughout the S. 10 cents an hour for hourly rkers and 8 per cent for certain lary groups. The increases add out $6.5 million to the firm's an- al payroll.

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Mfrs. of Car Movers, Winches, Truck Cranes, etc.

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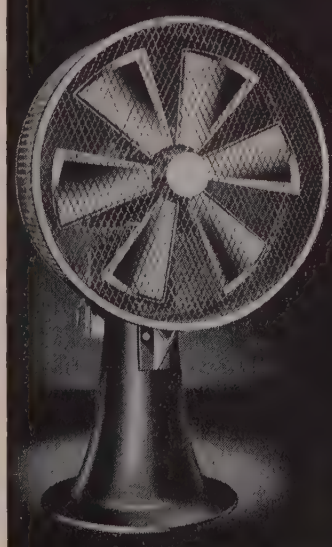

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Get UNIFORM MACHINABILITY
FAST, LOW COST PRODUCTION
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COLD FINISHED STEEL
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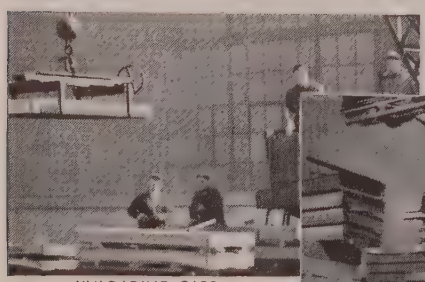
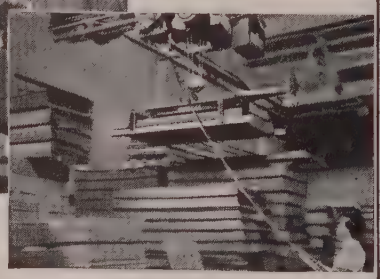
PREVENT WASTE OF PRECIOUS STEEL



UNLOADING CARS



INDOOR STORAGE

Besides the increased storage and decreased labor incident to handling sheet steel in packages with the Mansaver Grab, consider this: individual handling, particularly of the lighter sheets, bends corners, dents edges—a serious waste. Mansaver Grabs protect the sheets when transported around the plant, eliminating special slitting and trimming. Catalog on request.

OTHER MANSAVER GRABS SUPPLIED FOR HANDLING COILS, BOXES, BARRELS, ETC. EITHER HAND OR MOTOR DRIVEN. WRITE FOR CATALOG.

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Information for Exporters

Latest export booklet available free of charge from the Office of Small Business, Economic Cooperation Administration, 815 Connecticut Ave. N. W., Washington 25, is the "Trieste Directory of Importers." Additional copies also have been printed of the 114-page booklet entitled "France—Directory of Importers, ECA Financed Commodities."

Director of Compliance

John Peckham was appointed director of compliance, National Production Authority. He is to function in the office of the general counsel, Manly Fleischmann, and under Mr. Fleischmann's supervision.

Lilienthal Setting Up Shop

David E. Lilienthal, former chairman, Atomic Energy Commission, plans to open an office in Washington soon as an industrial and business consultant. Although trained as a lawyer, he proposes not to practice law but rather to specialize on the problems of industrial concerns in setting policies.

Preprints Available

Preprints of the "Coke and Coal Chemicals" chapter of the Bureau of Mines Minerals Yearbook for 1949 now are available from the Superintendent of Documents, Government Printing Office, Washington 25, at 15 cents a copy. Its 60 pages are more replete than ever with statistical information on world and United States production of coke and coal-tar chemicals, on prices and so on.

GMC Gets $100 Million Contract

Roger M. Kyes, GM vice president and general manager of the GMC Truck and Coach Division, announces the Detroit Ordnance Tank Automotive Center, has given GMC a contract for $100 million for military vehicles for the Army.

Gunnison Builds Defense Homes

Gen. John J. O'Brien, president of Gunnison Homes Inc., New Albany, Ind., the prefabricated housing subsidiary of U. S. Steel, announces his company immediately will undertake erection of its first defense homes. One installation will be in Aiken, N. C., and the other in Paducah, Ky.

Both projects are in co-operation with the Atomic Energy Commission.

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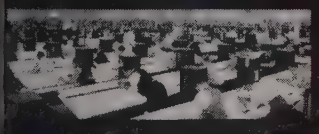

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INQUIRIES PROMPTLY ANSWERED

Scrap Tops War Records

Twenty-nine million tons flow to country's steelmaking furnaces and foundries

WITHOUT salvage drives, without fanfare and without wild price gyrations, the iron and steel scrap industry in 1950 provided steel furnaces and foundries with one of history's biggest crops of scrap. Its output easily surpassed the World War II years, and tied, or perhaps shaded, a subsequent record set in 1948.

The scrap came from all parts of the country, from all kinds of things. It came in the form of worn-out locomotives from Philadelphia, of rusted ships from California, of tangled fence wire from Iowa, of cotton bale ties from Alabama.

Output Up 6 Million Tons—In a 29-million ton flood, the scrap industry poured its product into the waiting open-hearth furnaces, which use a ton of scrap to a ton of pig iron; into the electric furnaces, which use scrap almost exclusively in making their high-quality steels, and into the foundries, where castings are using an ever-greater percentage of scrap. These were gross tons.

Factories Big Scrap Source—As usual during 1950, it was the metalworking factory that was the biggest source of purchased scrap. The institute estimates the 1950 total of this "industrial" scrap at 8 million gross tons. The railroads, due principally to the scrapping of steam locomotives in favor of diesels, stepped up offerings of scrap to 4 million tons.

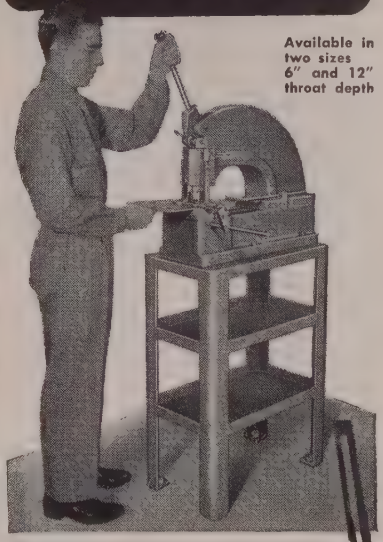
Of the remaining 17 million tons processed by the nation's scrap yards, the largest identifiable source were the auto wreckers, who made available an estimated 2.5 million tons in the process of finally disposing of cars they normally hold as a source of automotive parts for resale. Second largest identifiable source were the nation's 6 million farms, which provided an average of a quarter of a ton apiece, or a total of 1.5 million gross tons.

The farmer's quarter-ton compares with 425 pounds per capita for the whole country, or about a fifth of a ton per person. Both these averages are due to be stepped up even further during the year ahead, to make possible more scrap for more steel for defense.

Columbia Starts Expansion

Columbia Steel Co., U. S. Steel subsidiary, is beginning a second major postwar expansion of its sheet

di-acro PUNCH



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Now you can punch holes of various shapes as large as 4" diameter in 16 gauge steel—also blank, draw, emboss, form, — with the versatile DI-ACRO Punch. It is ideal for both experimental and production work.

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DON'T LET IT HAPPEN IN YOUR PLANT!

PICKLING fumes do more than irritate your nose. They carry tiny drops of acid high above the tank and deposit them on roof girders, overhead cranes, conveyors, window frames, pipes and electrical fixtures.

The acid drops are small but they can cause a lot of trouble. They eat through paint and into steel, and rust creeps in behind them. Someday, somewhere, something goes wrong!

Don't let it happen in your plant! Use Oakite Composition No. 38, the new pickling additive that traps the acid fumes before they leave the tank!

FREE The Oakite Technical Service Representative in your city will be glad to show how Oakite Composition No. 38 can hold down your pickling fumes. Phone him or write to Oakite Products, Inc., 34E Thames St., New York 6, N. Y., for further information.

ALSO *ask about Oakite procedures for:*

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and tin mill at Pittsburg, Calif., designed to increase cold-reduced sheet and tin plate production about 215,000 net tons annually.

Columbia says it will be "a multimillion dollar expansion." Outside sources estimate it will cost around $28 million. This is in addition to the $30 million invested in 1947-48 in the first major postwar enlargement of the big San Francisco bay area plant.

Alden G. Roach, president, says new facilities will give the plant a total rated capacity of approximately 540,000 net tons annually of sheet and tin plate.

A new four-stand cold reduction mill and related equipment will increase the capacity for cold-rolled products. An additional continuous pickling line will be installed along with added annealing equipment. Among the modern equipment will be a continuous galvanizing line for the production of galvanized sheets. Also to be installed is a second electrolytic tin plate line.

Alco Sets Up Tank Division

American Locomotive Co. established an entirely new organization at its Schenectady, N. Y., plant to handle ordnance production. It will continue intact its peacetime organization for the manufacture of diesel-electric locomotives.

Railroad customers are assured in a policy letter sent by Mr. Fraser that Alco-GE locomotives and parts will continue to be produced at capacity levels, and that commitments on deliveries will be met, unless national conditions affecting all builders interfere.

Alco will build the newly-announced medium tank described by the Department of the Army as "an improved General Patton with greater firepower" in shops which formerly were used to produce steam locomotives. "Beginning with engineering, and through the purchase of raw materials, production and accounting, all ordnance manufacturing at the Schenectady plant will be handled by an entirely separate organization," Mr. Frazer says.

Aetna-Standard To Expand

A $2 million expansion program for Aetna-Standard Engineering Co.'s Ellwood City plant is announced by Chairman-President E. E. Swartswelter.

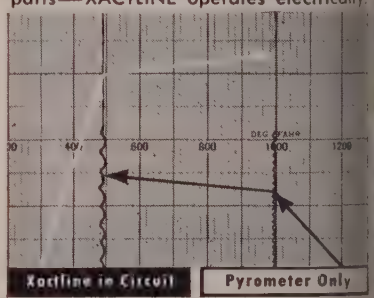
The company will need about 1000 more men as a result of a big vol-

Automatic "STRAIGHT-LINE" TEMPERATURE CONTROL with XACTLINE

ELIMINATE *Overshooting Undershooting*

Are you going to continue to put up with that troublesome overshooting and undershooting inherent in your conventional pyrometer control — especially when it is so easy to eliminate that saw-tooth effect?

Put XACTLINE in the control circuit. XACTLINE anticipates the temperature changes — before they occur. And too, it nullifies the varying amounts of thermal lag, residual heat, and mechanical lag — producing a short on-off cycle resulting in "Straight-Line" temperature control. This performance is possible because there is no dependence upon mechanical parts — XACTLINE operates electrically.



Exact reproduction of temperature chart for a heating process showing the comparison of the "Straight Line" temperature control produced by XACTLINE and the saw-tooth curve obtained with only conventional control.

XACTLINE is applicable to any indicating or recording pyrometer control of the millivoltmeter or potentiometer type. It should be used wherever close temperature control is required — any type of electrically heated oven, furnace, kiln, injection molding machine, and fuel-fired furnaces equipped with motor-operated or solenoid valves.

XACTLINE is a complete unit. No adjustment or coordination with the control instrument is required regardless of the size of the furnace, length of the heating cycle, or size of the load. Installation is very simple — can be either flush or surface mounted.

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of steel plant business. It al- ly employs 1000 at the Ellwood plant.

he company will let contracts at e and is applying for certificates ecessity so it may accelerate de- iation on them.

plans to build a machine shop, by 380 feet, and an assembly ding, 55 by 380 feet. It also will amp another building for the ndry.

mco Modernizes East Works

\$3 million modernization pro- m for the hot strip mill at Armco el Corp.'s East Works will begin . 2. The repair work will take ut two weeks to complete.

. F. Reinartz, Armco's assistant e president and manager of the Middletown division said that in an- pation of the shut-down of this artment, Armco built up an in- tory of hot-rolled steel coils. This s made up of coils purchased by mco customers from other steel ducers which Armco will convert o finished sheets, along with a t of the normal accumulation of mco's hot rolled production.

thur V. Wiebel Heads TCI

Robert Gregg retired as president the Tennessee Coal, Iron & Rail- d Co. effective Jan. 1. He is suc- ded by Arthur V. Wiebel, former- vice president in charge of opera- ns.

John Pugsley was elected to the wly established position of execu- e vice president. J. M. Spearman s named vice president in charge operations.

rd Expanding, Modernizing

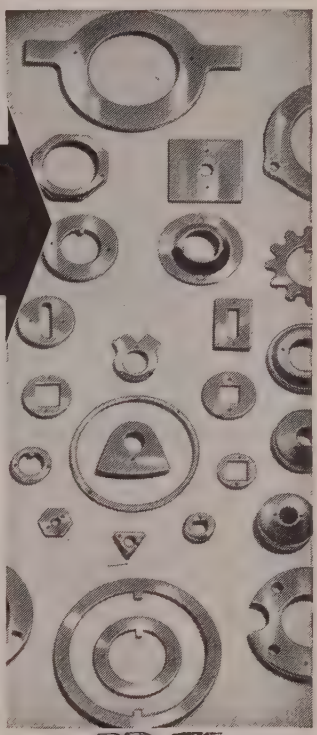
Ford Motor Co., pursuing its in- tion to expand and modernize its cilities to the tune of \$1 billion er the next three years, recently ught two sites for service parts pots. A 16-acre tract fronting on ckson and Warford streets in Mem- is will contain a new depot and les office building measuring 240 x 0 feet. Completion of the facility scheduled for June 1. On a nine re site on Industrial boulevard near ntinental avenue in Dallas a 240 x 0 foot parts depot will be erected Austin Co. Construction of this cility will also begin soon.

ir Reduction Builds in Butler

Purchase of a site for the erection another link in its chain of plants roughout the country for the man- facture of oxygen and nitrogen,

Since 1887

MILWAUKEE WROT WASHERS



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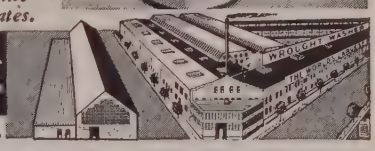

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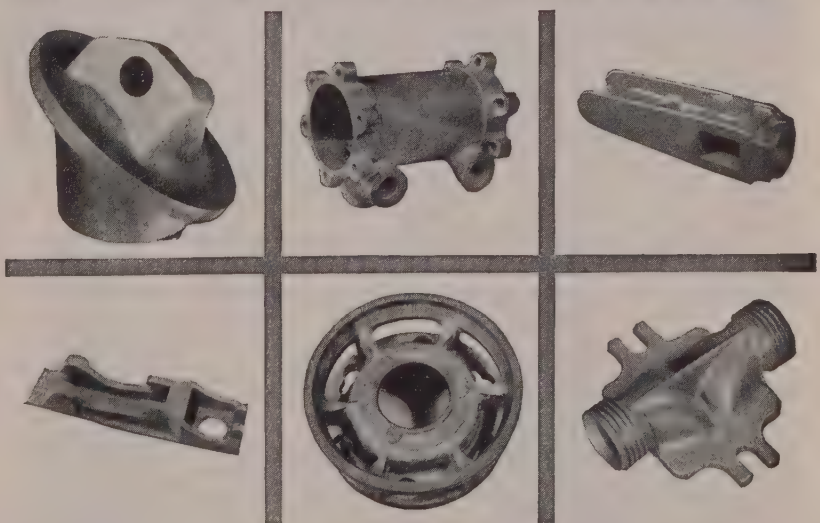


These intricate precision castings made from frozen mercury patterns assure you of soundness—accuracy—close tolerances—60-80 micro finish and minimum machining in size ranges not available by conventional casting methods. All ferrous and non-ferrous metals. Inquiries invited. Brochure on request.

MERCAST PROCESS

ALLOY PRECISION CASTINGS COMPANY

EAST 45th ST. AND HAMILTON AVE. • CLEVELAND 14, OHIO

with related facilities, is announced by H. R. Salisbury, president of Air Reduction Sales Co., New York.

The new plant and facilities, designed by Air Reduction and to be constructed by Koppers Co., Pittsburgh, will occupy a tract of land covering about 23 acres in Butler, Pa. The new plant will be in operation the latter part of 1951.

Follansbee Enlarges Warehouse

Follansbee Steel Corp. is quadrupling its Pittsburgh warehouse space with the conclusion of arrangements for the purchase of a warehouse building on the South Side.

Follansbee is selling its old warehouse building in downtown Pittsburgh to the Urban Redevelopment Authority, which is one of the agencies carrying out the Point Park program in the city's Golden Triangle.

The South Side building was occupied until recently by the Dilworth Porter division of Republic Steel Corp. and was used for the manufacture of railroad equipment. Its 100,000 square feet represent an increase of warehouse space for the new tenant of approximately 300 per cent in area.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1140 tons, Corwith freight house, Chicago, for Santa Fe System lines, to Bethlehem Steel Co.

750 tons, sheet steel piling, new harbor on Ohio river near Marietta, O., for Electro Metallurgical Division, Union Carbide & Carbon Corp., New York; Dravo Corp., Pittsburgh, general contractor.

STRUCTURAL STEEL PENDING

Unstated, wheel gate, Potholes East canal, Columbia Basin project; bids to Bureau of Reclamation, Denver, Jan. 16.

Unstated, switchyard and transformer circuits, Hungry Horse power house, Montana; bids to Bureau of Reclamation, Denver, Jan. 11.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1000 tons, shopping center, Evergreen Park, Ill., to Ceco Steel Products Corp., Chicago; George A. Fuller Co., Chicago, general contractor.

845 tons, dormitory, boiler house and other buildings, Alverno College, Milwaukee, to Ceco Steel Products Corp., Chicago; James McHugh Construction Co., Chicago, general contractor.

250 tons, housing project Fort Richardson, Alaska, to Northwest Steel Rolling Mills Inc., Seattle; Patti-McDonald Co., general contractor.

180 tons, Magnolia junior high school, Seattle, to Bethlehem Pacific Coast Steel Corp., Seattle; Strand & Son, general contractor.

125 tons, Stanton high school, Alliance, O., to United States Steel Supply Co., Chicago.

REINFORCING BARS PENDING

4000 tons, power house, Paducah, Ky.

150 tons, American Radiator & Standard Sanitary Corp., Cleveland.

PIPE . . .

CAST IRON PIPE PENDING

175 tons, 8 and 6 inch, bell and spigot; bids to Bertha Satterstrom, city clerk, Montesano, Wash., Dec. 26.

RAILS, CARS . . .

RAILROAD CARS PLACED

Army Ordnance Corps, 602 motor busses, to AFC-Brill Motors Co., Philadelphia.

FERROALLOYS

(*Continued from page 399*)

Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. add 5c for each 0.25% of N above 0.75%.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. S M x D, bulk 23.25c per lb of contained Cr, c.l., packed 24.15c, ton 25.50c, less ton 27.25c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract, Carload, packed, S MxD, 16.10c per lb of alloy; 1 ton 16.95c; less ton lot, 18.15c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34.41%, Si 42-49%, C 0.05% max.) Contract, carload lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.00c per pound of contained silicon; 1" x down, bulk 20.65c per pound of contained chromium plus 11.50c per pound of contained silicon, f.o.b plant; freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7-9%, C 0.05% max.) 21.75c per lb of contained silicon plus 12.0c per lb of contained silicon plus aluminum, 3" x down, delivered.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract carload, 1" x D; packed, max 0.50% C grade, $1.08 per lb of contained chromium, ton lot $1.10, less ton $1.12. Delivered. Spot add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $3.25 per lb of contained W; 2000 lb W to 10,000 lb W, $3.35; less than 2000 lb W, $3.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $4.15 per lb of contained W; less than 1000 lb W, $4.25.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 19.00c per lb of contained Si; packed 20.40c; ton lot 21.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered, Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 15.55c per lb of contained Si, carload packed 16.8c, ton lot 17.8c, less ton 18.95c Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.5c per lb of contained Si, carload packed 18.7c, ton lot 19.65c, less ton 20.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 20.0c per lb of Si, c.l. packed 21.2c, ton lot 22.1c, less ton 23.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe.) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.65c per lb of alloy.

Handling BAGGED GOODS?

Do it *FASTER* — more *EFFICIENTLY* with a POWELL Job-Designed container . . .

Style 412
WHSE Stacking Unit

Container pictured here was Job-Designed by Powell to safely and efficiently transport and store bags of carbon black and synthetic rubber elements for a leading rubber manufacturer.

It affords easy accessibility to a single bag or a container full. Can be used as a bin. Speeds production and inventory. Keeps storeroom neat. Tiers to any desired height.

Powell Job-Designed equipment best suits the job, because it was built for the job. Powell representatives in principal cities.

Send inquiries to Dept. 311

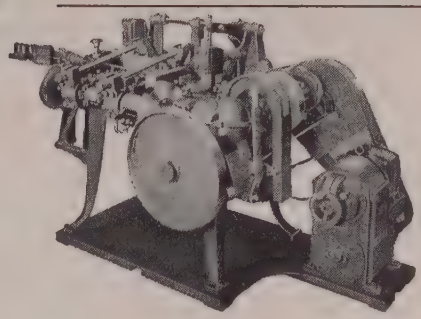
POWELL PRESSED STEEL SINCE 1920

THE POWELL PRESSED STEEL CO. • HUBBARD, OHIO
ORIGINATORS OF COLD FORMED ALL STEEL HANDLING EQUIPMENT
(In Greater Youngstown)

THERE'S NOTHING LIKE A

NILSON

Designers and Builders of Automatic Wire and Metal Forming Machinery

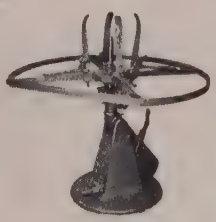


For
SPEED IN PRODUCTION
•
ACCURACY IN FORMING
•
VERSATILITY IN APPLICATION
•

Look at a Nilson Four Slide Machine for "Formed Stampings." Nilson Four Slide Machines are fully automatic in operation. "F" Models with built-in Press pierce, stamp or swage, then form—the complete piece made in one operation. A wide range of sizes is available to handle your particular requirements most economically.

NILSON WIRE REELS

The illustration shows one of the many units we manufacture. These reels, made in stationary and tilting models from 75 to 500 lbs. capacity, can be used for either wire or coiled metal. Special types are available.



Automatic Wire and Metal Forming Machines—Staple Forming Machines — Chain Making Machinery — Wire Reels — Wire Straighteners

All inquiries concerning Nilson Products will be given prompt attention and full data will be forwarded upon request.

THE A. H. NILSON MACHINE CO.

1501 Railroad Ave. Bridgeport 5, Conn.

SPECIALISTS IN WIRE FORMING EQUIPMENT FOR OVER 50 YEARS

DIAMOND

PERFORATED METALS TO YOUR REQUIREMENTS

STAINLESS STEEL, STEEL
ALUMINUM, BRONZE
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ARCHITECTURAL
GRILLES

DIAMOND GRILLES

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Diamond Mfg. Co.

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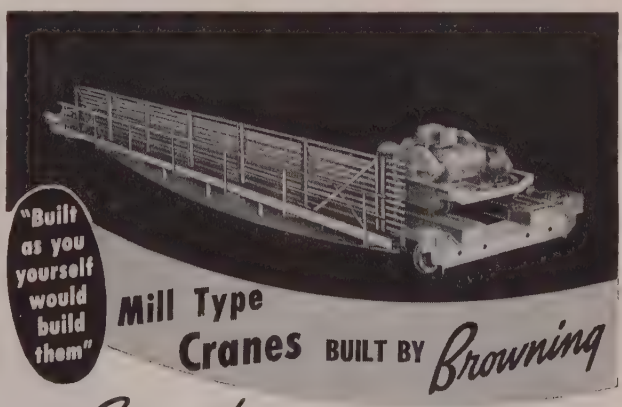


Mill Type Cranes BUILT BY *Browning*

HAVE *Strength* WHEREVER STRENGTH IS NEEDED

Satisfying A.I.S.E. specifications, Browning Mill Type Cranes incorporate types of motors and controls on which you have standardized. This flexibility suits your VRB crane *perfectly* to your needs. Our design, springing from 49 years' experience, places plenty of strength where it is required.

Ask for our Bulletin "S".

Husky 10-ton mill type trolley equipped with separate load girt for easy removal.

VICTOR R. BROWNING & COMPANY, Inc.
BOX 309, WILLOUGHBY (CLEVELAND), OHIO
Designers and Builders of Electric Overhead Traveling Cranes and Hoists, and Electric Revolving Cranes

ton lots packed 10.05c, 200 to 1999 lb 10.40c, smaller lots 10.90c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 14.50c per lb of briquet, carload packed 15.2c, ton lot 16.0c, less ton 16.9c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.95c per lb of briquet, c.l. packaged 11.75c, ton lot 12.55c, less ton 13.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 11.15c, per lb of briquet, c.l. packed 11.95c, ton lot 12.75c, less ton 13.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si) Contract, carload, bulk 6.95c per lb of briquet, c.l. packed 7.75c, ton lot 8.55c, less ton 9.45c. Delivered. Spot, add 0.25c.

(Small size—weighing approx 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.9c, c.l. packed 7.7c, ton lot 8.5c, less ton 9.40c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 21.0c, ton lot 22.3c, less ton 23.3c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.). Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $167 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $183 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $3.00 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3.10. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.20.

Grainal: Vanadium Grainal No. 1, 93c per lb; No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.20 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Zirconium Alloys

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l. lump, bulk 7.0c per lb of alloy, c.l. packed 7.75c, ton lot 8.5c, less ton 9.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contract, lump carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Si 8% max., C 0.4% max.). Contract, ton lot, 2" x D, $4.90 per lb of contained Cb, less ton $4.95. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min., C 0.30 max.) ton lots, 2" x D, $3.75 per lb of contained Cb plus Ta, delivered; less ton lots $3.80.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.0c per lb of alloy; ton lots 18.0c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe) Lump, carload, bulk 14.50c, packed 15.50c ton lots, packed, 15.75c; less ton lots, packed, 16.25c per lb of alloy, delivered to destination within United States.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

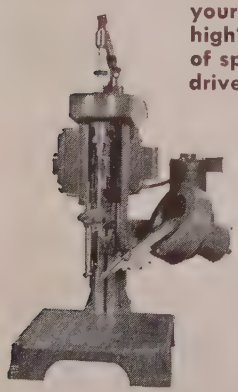
Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth, $1.32; Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth $1.14, packed in bags containing 20 lb of molybdenum; Washington, Pa., 95.00c.

Have You An Assembly Problem?

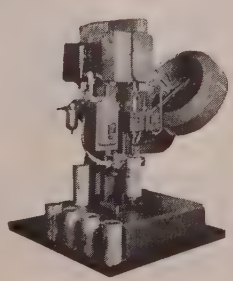
LET OUR SPECIALISTS HELP YOU

Are you still using slow uphill hand methods that keep your assembly department in low gear and labor costs in high? Discard them and get on to the rapid straight-away of speedy, inexpensive production offered by D.P.S. power-driven machines.



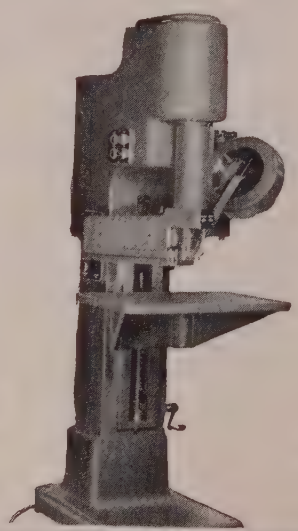
DETROIT POWER SCREWDRIVERS

Drive screws as fast as one a second—all types of screws—no marring of heads or stripping threads—all screws driven to uniform tension—Hopper-fed—SCREWS ALWAYS IN SIGHT OF OPERATOR—3 models, one to fit your requirements.



SPECIAL ASSEMBLING MACHINES

For light assembly operations using Hopper Units to feed component parts.

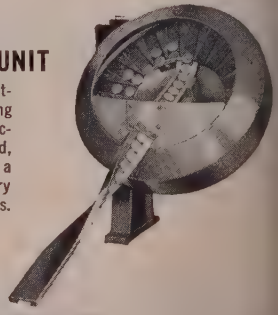


DETROIT POWER NUT DRIVER

A revolutionary new machine that drives nuts with amazing speed, either semi-automatically, or it can be adapted to full automatic operation entirely eliminating the manual handling of nuts. Capacity: nuts, 3/16" min. to 1 1/16" max. across flats.

THE HOPPER UNIT

Motorized—Highly Adaptable—A selective feeding device whereby production parts are selected, oriented and fed in a given position for primary and secondary operations.



Write for Catalog

DETROIT POWER SCREWDRIVER CO. 2811 W. FORT ST. DETROIT 16, MICH.

elalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

Arkansas

npton Co., Waynesboro, Va., selected Jesse M. Shelof Robert & Co., Atlanta, as the architect for a $2 on textile finishing mill.

California

struction of two huge aircraft hangers, costing $350,was started at **Lockheed Aircraft Terminal,** Burbank, f., for the Flying Tiger Line and Slick Airways, allght airlines.

Illinois

rnational Minerals & Chemical Corp., Chicago, plans uild a central research laboratory in Skokie, Ill. Neations are under way for purchase of a 15-acre site the building which will provide about 33,000 square and accommodate a staff of about 75 persons. Conction will get under way as soon as zoning problems settled. Research is to be carried on in connecwith the various activities of the corporation.

Illinois

pac Inc.—gaskets, packing, washers, valves, etc.—kie, Ill., awarded the general contract for a factory ding to Lee Construction Co., Chicago. Estimated cost 250,000.

Illinois

lic Service Co. of Northern Illinois, Chicago, awarded ract for construction of the superstructure of its No. nerating plant in Waukegan, Ill., to Bates & Rogers, cago. Estimated cost is $12 million. Sargent & Lundy, cago, is the consulting engineer.

Illinois

mpson Wire Co., Franklin Park, Pa., awarded the eral contract for a plant addition to Ragnar Benson 4744 W. Rice St., Chicago.

Kentucky

eral Mills Inc., Minneapolis, approved plans for a $1 ion grain elevator and warehouse in Jefferson county, tucky. McDonald Engineering Co., Chicago, is the struction engineer.

Kentucky

e Turns Inc., Louisville, appointed Bethlehem Supply and Bethlehem Supply Co. of California as distribuof its welding fittings and flanges. Bethlehem Sup Co., a subsidiary of Bethlehem Steel Co., has its main es in Tulsa, Okla.; George A. Tompson is president C. R. Zimmerman is executive vice president. Bethle Supply Co. of California, a subsidiary of Bethlehem ific Coast Steel Corp., has its main offices in Los geles; Wendell M. Jones is vice president and general nager; J. W. Hollingsworth is general manager of s. Tube Turns Inc. is a large manufacturer of seamwelding fittings for industrial piping.

Maryland

oax Products Co., Baltimore, maker of special elecnic apparatus, such as vibrators, transformers, etc., converters and rectifiers for electronic laboratories, ved into larger space in a building in the 3300 block of tern boulevard. H. A. Cook is president.

Maryland

rison Chemical Corp., Baltimore, with local plant at tis Bay, is expanding at the cost of $112,000. The pany is constructing a manufacturing building and a rage building as an expansion of its facilities for the duction and storage of sodium silicate solution.

Maryland

F. & G. Tool & Die Co. Inc., Baltimore, moved into er space in the building it occupies at 611 Williams St. ditional equipment is being installed.

Maryland

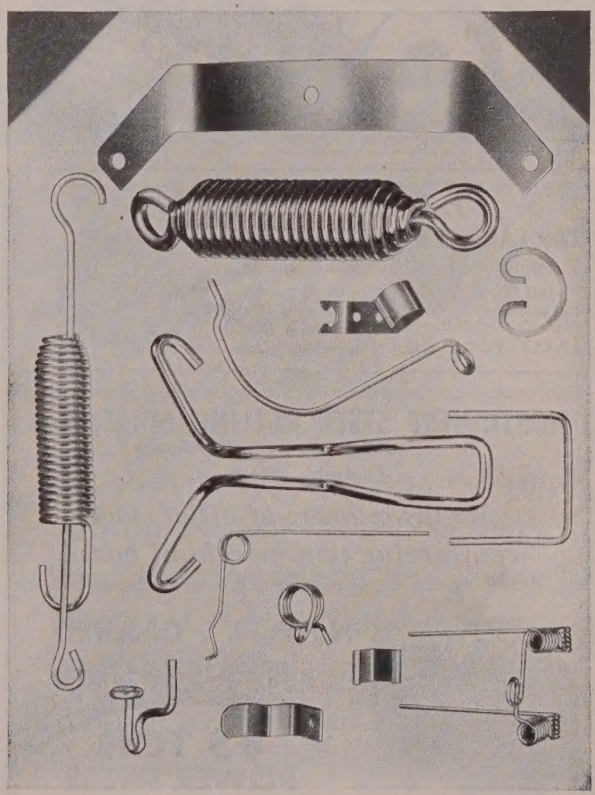
vance Tool Co., Baltmore, maker of dies and small s, metal stampings, etc., plans to move shortly into er quarters in a building on Joppa and Satyr Hill ds, about three miles east of Towson, Md.

Michigan

tsburgh Limestone Corp., Pittsburgh, and **Michigan lestone & Chemical Co.,** Rogers City, Mich., subaries of United States Steel Corp., will be merged a single operating subsidiary, effective Jan. 2, 1951. merged company, to be known as Michigan Limene & Chemical Co., will have its executive offices in Guardian Bldg., Detroit. District operating headquars will be continued at New Castle, Pa., Buffalo and

• **Nothing less than the best ever leaves our plant—Continuous inspection, precision equipment and skilled spring technicians make certain that the springs and small parts you order meet specifications "on the head". Call on us now for all spring and part requirements!**

No order too large or too small



The U. S. STEEL WIRE SPRING Co.

7800 FINNEY AVE. • MICHIGAN 1-6318

CLEVELAND 5, OHIO

Capacity GRABS

assured by OWEN Grapples

THE OWEN BUCKET CO.
6012 BREAKWATER AVE., CLEVELAND, O.
Branches: New York, Philadelphia, Chicago, Berkeley, Calif.

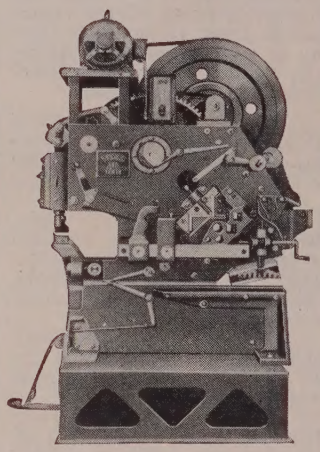
WEBB

STEELWORKER

The Newest Combination Punch & Shear Designed For Diversified or Production Work

5 Complete Tools in ONE

6 WEEKS' DELIVERY



1 Punch for plate, bars or structurals.
2 Cuts angles and tees with straight or miter cut.
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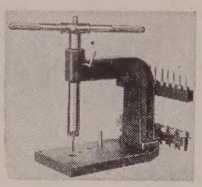

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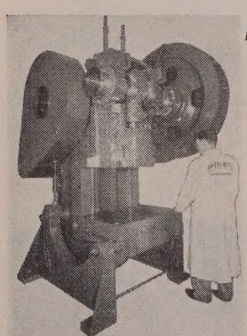

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rs City. The present headquarters offices of Pitts- n Limestone Corp. in the Frick Bldg., Pittsburgh, be transferred principally to Detroit. Some depart- s will be transferred to New Castle, Pa., where Vard Lewis will continue as manager of operations. L. Clymer, head of both present subsidiaries, will me president of the merged company. Other officers be J. P. Kinville, assistant to president and treasurer; . Lewis, vice president—operations; C. F. Platz, vice dent—sales; H. R. Baltzersen, comptroller and assist- secretary; John G. Patterson II, secretary. The ed company will continue the present operations of stone quarries at Rogers City, Hillsville, Pa., and ille, W. Va.; underground limestone mines at Annan- Pa., East Brady, Pa., and Worthington, Pa.; and stone processing plants at Conneaut, O., and Buffalo.

Minnesota

-Chalmers Mfg. Co., Milwaukee, named R. E. Bur- ster Electric Co., Minneapolis, a dealer for its trans- ers in Minnesota, North Dakota, in South Dakota of the Missouri river, and in western Wisconsin.

Missouri

erson Electric Mfg. Co., St. Louis, purchased for $3,- 500 the plant in that city which it built and operated the government during World War II. It produced turrets at the unit in the war years and has been pying the plant since Apr. 1, 1946 under a five-year with an option to buy. Emerson has under con- tion another plant at Bedford, Ind., scheduled to be pleted about Apr. 1, 1951. Emerson's Washington plant in the St. Louis area still is owned by the rnment. The company moved into the latter plant 948.

New Jersey

ling Instrument Co. moved its office from Newark, J., to 5 Vose Ave., S. Orange, N. J.

New Mexico

s-Chalmers Mfg. Co., Milwaukee, appointed Union In- rial Corp., Carlsbad, N. Mex., a dealer for Allis- lmers motors, controls, pumps and Texrope equipment ddy, Lea and Chaves counties in New Mexico.

New York

H. Krause purchased **Blue Seal Asbestos Corp.,** oklyn, N. Y., and will function as its president. This pany fabricates insulating parts. Mr. Krause for- ly was New York works manager for Trumbull Elec- Mfg. Co., Plainville, Conn., a General Electric affiliate manufacturing facilities in Maspeth, Long Island, Y.

New York

tury Lighting Inc. moved its offices to 521 W. 43rd New York. Expanding facilities enable the company demonstrate practical solutions to lighting problems a "working auditorium" specially designed for the pose.

Ohio

ional Tool & Die Manufacturers Association moved its ces to 906 Public Square Bldg., Cleveland. George S. on is executive secretary.

Ohio

o River Steel Corp., Toronto, O., expects to have its ge and bar mill in full production within a few days. n-hearth and finishing departments are expected to n full operation within a short time. Harold J. Evans ice president and production manager.

Ohio

erican Fire Clay & Products Co. is moving its main ce to its plant on state route 46 at Western Reserve d, P.O. Box 157, Canfield, O.

Oklahoma

es Service Oil Co., Bartlesville, Okla., awarded a con- t to M. W. Kellogg Co., New York, for a refinery in ca City, Okla.

South Carolina

ted Piece Dye Works, Lodi, N. J., plans to build a $1 ion finishing dyeing and printing plant at Hanahan tion, Berkeley county, South Carolina. Francisco & obus, New York, is the engineer.

Tennessee

d Motor Co., Dearborn, Mich., plans to build a re- nal parts depot in Memphis, Tenn. The building will equipped with the latest type of handling equipment.

Texas

d Motor Co., Dearborn, Mich., plans to build a service ts depot in the Trinity industrial district, Dallas. The ject will represent an investment of about $1 million, clusive of land or equipment.

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